AUGUST 1959

A MEGRAW-HIL

The Fourth Kolbe Wheel ... p 82

### Now-more light, less weight, longer life with

### NEW EDISON MODEL S ELECTRIC CAP LAMP

MSA announces another new high in lighting efficiency in the world's most popular cap lamp. Increased light output of the new Edison Model S Lamp assures greater safety for the miner, more tons per shift for the operator. Let's face a fact: Dimness costs money. Fair lighting does only a fair job. Maximum lighting-the brilliant, unfailing Edison Model S kind-helps get jobs done with top speed and safety. And

the simplified method of charging new Model S Batteries-with the AUTOMATIC LOW-VOLTAGE SYSTEM—is convenient, thrifty and highly efficient. Lets miners take their lamps and rack them-quickly-without loss of time or waste motion. When planning a new lamphouse installation or modernizing your present one, call in the MSA Representative. MSA can help you solve your lighting problems.



wly issued U.S. Bureau lines Approval 6D-31, April 16, 1959.



MINE SAFETY APPLIANCES COMPANY • 201 North Braddock Avenue, Pittsburgh 8, Pennsylvania MINE SAFETY APPLIANCES CO. OF CANADA, LIMITED . Toronto, Calgary, Edmonton, Montreal, Sydney, Vancouver, Winnipeg

Look how small the headpiece is. Weighs only a few ounces. Feels even lighter on the head. You get a clear, sharp spot every time.

Increase in working light appeals to me. This new Edison Model S gives 15% more than we ever had before. And they didn't cut their bulb service life rating to do it. The double filament bulb means we'll always have working light to finish the shift. Each filament of the Edison Model S krypton-gasfilled bulb has a 400-hour designed life.

Just watch the improvement in our safety and tonnage reports. More light. Less weight. Longer life. Even the battery's better. It has a new active material that boosts service life. They went all-out to meet the miner's needs with this one.



# All B.F.Goodrich Grommet V belts are double-matched at no extra cost

### B.F.Goodrich V belts now have 40% greater horsepower rating

ALL B.F.Goodrich V belts now have 40% greater horsepower rating. This higher capacity rating was formerly found only in high capacity belts, but now costs no more than former standard belts. This means that lighter, more compact, and lower cost drives can now be used, because these B.F.Goodrich belts carry the horsepower needed for efficient drives using fewer belts at standard belt prices. And all B.F.Goodrich Grommet belts are double-matched.

Double matching assures you that

a set of B.F.Goodrich W belts are of equal length when installed and will stay uniform in length for the life of the belts. When V belts of different lengths are put on the same drive, longer belts loaf, while shorter ones carry all the load and fail quickly. B.F.Goodrich double-matched belts are measured twice for uniform length, once when manufactured and again after storage. Only belts that are of equal length when manufactured and after storage are grouped into sets.

Grommet construction is exclusive

in B.F.Goodrich V belts. Grommets are two extra strong cord loops, inside the belts, like twisted cables, except they are endless. Unlike ordinary belts, there are no center cords in the Grommet belt, so it is more flexible, can "give" temporarily and absorb shock loads.

Let your B.F.Goodrich distributor show you how this higher capacity, longer belt life, ability to stand hard use, can reduce your V belt costs per year and make other savings in operating and maintenance costs. B.F.Goodrich Industrial Products Co., Thept. M-665, Akron 18, Obio.

### B.F.Goodrich v belts

### Stone quarry owner rates Chevrolet best at saving money



### "My '59 Chevies move more material at less cost than any other make I've had."

—R. G. SNYDER, SNYDER STONE QUARRY; MARTINSVILLE, VIRGINIA "Put a Chevrolet out on the job and it'll stay there. Upkeep costs are at a low minimum. You never do wear one out; you just get tired of looking at it and buy a new one.

"I move material at less cost per mile with this '59 Chevrolet than any other make of truck I've ever had. And it'll move over the road with a full load as fast as a light truck. Chevrolet trucks get better and better every year. I've never seen a more dependable truck than this '59. Keeps going and going with no downtime at all for major service work."

Chevy, you'll find, is winning a lot of new boosters among mining and quarry men, for a number of good reasons. Reasons like money-saving power, for instance. Chevrolet for '59 offers newly improved valve-in-head 6's that nurse a gallon of gas like nothing in trucks has before. Or big V8's for every Series that include the shortest stroke design—the best saving design—in the field. And for the toughness that leads to low maintenance, Chevy's advanced chassis components are specially designed for the capacity to out-muscle the roughest kind of runs. For the latest in low-cost hauling equipment, see your Chevy dealer! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



No job's too tough for a Chevrolet truck!



TAKES OFF
ITS HAT
TO NOBODY!



Machine, lag, and carriage bolts. All sizes. Quick delivery from stock.

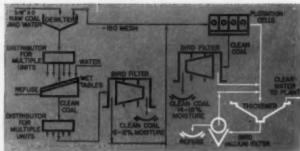


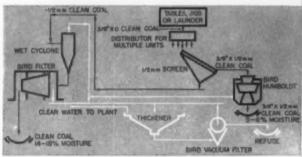
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM STEEL



### NEW AND BETTER WAYS



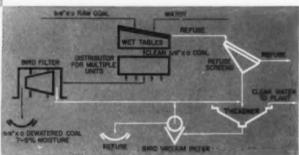


### TO DEWATER

How do these flow systems compare with your preparation set-up?

How much coal could one of them save you? How many dollars?

Why not talk it over with one of our experienced application engineers? Unless he can guarantee definite improvement or savings he won't recommend Bird equipment.





This is the Bird-Humboldt Dryer shown in one of the flow charts. It delivers 3/8" x ½ mm coal at 5% surface moisture or less, with almost no degradation or loss of solids. It takes less than 0.2 KWH per ton of dried coal; operates up to 3000 hours without changing screens.

On Stoker Size Coal — the Bird-Humboldt gets it dry and whole, for a total cost of five cents a ton or less — a whale of a lot less expensive than heat drying. Better look into it.

This is the Bird Solid Bowl Centrifugal Filter that takes the ½ mm fines from flotation cells or cyclone underflows and gets them drier than by any other mechanical means, at lowest cost per ton.





### BIRD

LEADING AUTHORITY ON SOLID-LIQUID SEPARATIONS

#### Builders of

- Bird Continuous Centrifugal Separators
- Bird-Prayon Continuous, Rotary, Horizontal Vacuum Filters
- . Bird-Young Single Cell Rotary Vacuum Filters
- . Bird Horizontal Tank, Vertical Leaf Pressure Filter
- . Bird. Humboldt Screen Type Oscillating Contributes
- Bird Suspended Contrifugats Bird Contrifugal Classifiers

For specific information or individual machines write:

### COMPANY

South Welpole, Mass.
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AUGUST 1959

## This Month in COAL

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#### ▶ Market Development

Opportunity	for Coal:	Regional	Selling		
of Coal-Bu	urning Equ	uipment .		p	68

Martin Burke Jr., president, North Western-Hanna Fuel Co. and Coal Burning Equipment Co.

On July 1, 1957, Lake Superior dock companies joined to organize the Coal Burning Equipment Co. It has pioneered in regional selling of modern residential, commercial and industrial coal-burning equipment in the highly competitive area of Upper Michigan, Wisconsin, Minnesota, North and South Dakota, and part of Iowa. CBE has demonstrated that this type of program can be beneficial to the coal industry. Equally important, it will apparently soon be self-supporting. Needed: A national program to encourage and guide formation of similar equipment agencies in all coalmarketing regions.

Featured-Editorial preface: What CBE's experience can mean to coal; panel: "For More Vigorous Attack on Coal's Markets"; equipment display.

#### ▶ Maintenance Ideas

Organizing	for	Be	etter	Mainten	ance		p	72
Daniel Ja	ackso	on	Jr.,	Assistant	Editor,	Coal	Ag	e

A maintenance organization and its program may seem complex when viewed as a whole but when broken down into its component parts it becomes simple and easy to understand. This feature does just

that in three simple steps: (1) organization-development, responsibility, authority; (2) personnel-selection, training; (3) procedure-policy, practice. Each topic is discussed in detail with emphasis on future requirements of maintenance organizations.

New Maintenance Service - Beginning with this special report on maintenance organizations Coal Age will offer each month a new department bearing the running line "Maintenance Ideas." This new section will permit a significant increase in the scope and volume of material for both maintenance men and operating men concerned with maintenance. For more on more phases of mine maintenance, see "Maintenance Ideas" every month in Coal Age.



### Stripping

#### The Fourth Kolbe Wheel-Two Million Yards per Month

Latest in a series dating back to 1944 new Kolbe wheel excavator at Cuba (Ill.) No. 9 mine, The United Electric Coal Cos., has a rated practical capacity of 3,500 cu yd per hr, compared to 1,000 cu yd per hr for the original wheel, also used at Cuba until retirement this year. With a weight of 2,100 tons, the new unit can dig at 9 to 100 ft above the coal; can move (Continued on p 7)

on see p 9. Age, 33 W. 42nd St., New York 36,

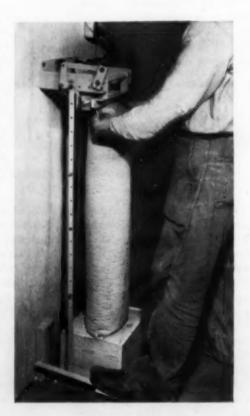
### Four Big Reasons for You to Switch to BEMIS EXPLOSIVES BAGS

- 1. By switching to an ammonium nitrate-fuel oil mixture, you can substantially reduce the cost of explosives. (Ask a Bemis specialist about proper mixtures for your individual job.) THAT'S ECONOMY
- 2. You can get a full, solid pack in Bemis Explosives Bags ... maximum explosive power in every hole. THAT'S EFFICIENCY
- 3. You can seal the poly liner with complete safety with the new Bemis "Tom Thumb" Heat Sealer. One man seals a bag in 5 to 6 seconds. No hazards. The cost? A modest \$120.00.

### THAT'S EFFICIENCY, CONVENIENCE AND ECONOMY

4. Bemis Explosives Bags are the toughest really waterproof explosives bags you can find. The special Bemis-extruded, seamless poly liner (look for the Red Line running lengthways) provides the waterproofness; the tough burlap or Bemis Flexiply® (multi-ply creped kraft) outer tube supplies the strength.

### THAT'S STILL MORE EFFICIENCY



Write or phone us for the complete story about Bemis Explosives Bags. A Bemis specialist will see you promptly.

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Where flexible packaging ideas are born

GENERAL OFFICES - 408 PINE ST., ST. LOUIS 2



dirt a maximum distance of 420 ft plus 25 to 30 ft of throw; and can spoil up to 119¼ ft above the coal. The wheel is used in tandem with a 35-cu yd shovel in overburden ranging from 65 to 85 to over 100 ft in thickness to recover the Illinois No. 5 seam averaging 4¾ ft in thickness.

Problem Solving—How the United Electric organization whipped dirt buildup in the digging wheel, the problem of feeding to belts, and speed, ice, transfer and idler problems in belt design and operation.

#### **▶** Gasification

Pipeline Gas From Char via the Lurgi Process p 92

Sidney Katell, Chief, Process Economics Evaluation Staff and John H. Faber, Chemical Engineer, USBM, Morgantown, W. Va., and Marc T. Constantine (formerly Chemical Engineer, USBM), Rocketdyne Div., North American Aviation, Inc., Canoga Park, Calif.

Analysts estimate capital investment of \$76 million is needed to build a Lurgi plant producing 90 million standard cu ft of pipeline gas per day from bituminous char. Per MCF with \$4 char, operating costs are put at \$0.56 and minimum selling price at \$0.72.

Plus Items—Process and plant diagrams; breakdowns of operating and capital costs.

### Continuous Mining

Remote Control for Continuous Miner Boosts Safety in Pillar Extraction . . . . p 98

W. G. Kegel, General Master Mechanic, Vesta-Shannopin Coal Div., Jones & Laughlin Steel Corp., California, Pa.

A search for a safer method of retracting a continuous miner from an impending-roof-fall area led to the development of a remote-control tram unit and a programmed swing arrangement by the Coal Division of the Jones & Laughlin Steel Corp. The remote control duplicates, physically and electrically, the tramming controls on the continuous miner and is wired in parallel with the original circuit. Fifty feet of 12-conductor cable link the remote control with the miner. If roof suddenly becomes unsafe, the operator pushes the swing valve down, starting the head automatically swinging toward the center where it stops. The operator then retreats to the safe location at the remote-control box and trams the machine out of the danger area.

Features—Photographs of remote-control components; electrical and hydraulic connections.

(Continued on p 9)

### This Month

### in COAL

BITUMINOUS PROSPECTS—It has recently been pointed out that depressions have followed the last three presidential elections, usually starting within a year and running about the same length of time. On that basis business should be good until 1961. Certainly it is good at the moment for most industries, though it has not brought bituminous coal the degree of recovery that normally would be expected, in part because of the continued depression in the export market. But by September production should be exceeding 9 million a week fairly consistently, and should hold the pace in the remaining months of 1959, barring some unforeseen relapse on the economic front.

And on Prices—Stability apparently will be the watchword in bituminous prices for the remainder of the year. Some purchasing experts feel, however, that the stage is being set for raises early in 1960 if not before, largely on the basis of firmness growing out of rising demand.

ANTHRACITE PROSPECTS-At least one longrange forecaster sees a slightly-warmer-than-last-year 1959-60 season in anthracite-burning territory. If so this will compound the pressures tending to depress demand, which pressures cut the output in the first half of the year to 9,858,000 tons (preliminary) compared to 10,510,000 tons in the first half of 1958. In any event, since temperatures are not likely to be lower next season the first-half pattern indicates a further loss in the second half, though from today's vantage point it could be limited to half a million tons or slightly more. And anthracite may get a little help from the fact that owners of 10-family and larger coldwater flats in New York City and Buffalo must now supply heat, the further fact that it is now becoming known that gas also is up to twice as expensive as coal for apartment and commercial-property service.

IT ALL HELPS—Both Pennsylvania and Kentucky are now committed to trying out the new Curtiss-Wright coal-and-coal-tar binder for highway, airport and other construction (see news section for details). Kentucky, for example, will put down 12½-mi strips. If it were necessary to process coal to obtain the tar a mile of road 20 ft wide, usual construction, would require 2,200 tons. If tar is obtained from the present sources and coal was used only for the admixture the requirements drop to 10 to 30 tons per mile. As one observer has put it: "It doesn't necessarily mean millions a year but everything helps."

NEW MINES—Are we on the verge of another modest—repeat modest—boom in the opening of new properties in the bituminous industry? The previous such boom was brought to an abrupt halt by the recent depression, but if the industry begins to work up to the levels of production still forecast for the early 60s new capacity will become a must, along with the need for replacing properties that work out in depression days as well as boom. Though the total so far in 1959 is not large an increase in the number of announcements of plans for new operations could mean that coal is heading back into an increasingly active development period.

### Simplex PRODUCTS GUIDE

SIMPLEX WIRE & CABLE CO., CAMBRIDGE 39, MASSACHUSETTS, U.S.A.



Simplex ANHYDREX insulated Cables for Power transmission and Communication (like the Simplex TIREX Portable Cords and Cables shown in adjacent column), though manufactured as stock products, are custom designed to suit all service requirements. A large technical and engineering staff at Simplex' main plant is equipped to give you the benefits of their long experience in electrical cable planning.



TIREX SO and SJO Cords — TIREX SO and SJO Cords are constructed to meet the most rigid specifications. All of their special features are carefully selected and processed to give maximum qualifications for portable service. They will twist without kinking, and bend without breaking. TIREX stranding affords maximum flexibility without sacrificing strength.

Conductor temperature rating 75c

CATALOGUE 1992



ANHYDROPRENE — Simplex ANHYDROPRENE Cables are designed for economical installation in ducts, conduits, racks, trays and raceways. Stock sizes AWG 14 to 1000 MCM are recommended for 90 C service in WET or DRY locations. The words 'Simplex ANHYDROPRENE" are either printed or molded plainly on the jackets of all ANHYDROPRENE cables. This marking signifies the traditionally high quality of a Simplex product.

CATALOGUE #1028



TIREX Low Voltage Portable Cables — TIREX Low Voltage Cables are individually designed for specific applications. They are practically indestructible when used to do the work for which they are intended.

Conductor temperature rating 75c

CATALOGUES :992 & :1011



ANHYDREX-NEOPRENE — Simplex ANHYDREX-NEOPRENE Cables have the added mechanical protection of a heavy wall of neoprene jacketing. These cables are manufactured for use in aerial installations and for direct burial service. Stock sizes AWG 14 to 1000 MCM are recommended for 90 C service in WET or DRY locations.

CATALOGUE #1028



TIREX High Voltage Portable Cables — TIREX High Voltage Portable Cables have unequaled strength and versatility. Designed primarily to transmit energy to mobile electrical equipment, they are also used as temporary power lines during alterations or emergency repairs.

Conductor temperature rating 75c

CATALOGUE #1012



ANNYDREX-PLASTEX — Simplex ANHYDREX-PLASTEX (AMHYDREX-insulated, PLASTEX-jacketed) Cables are scientifically designed for compatibility between insulation and
jacket, and for perfectly balanced performance in ducts,
conduits, aerial and direct burial installations. ANHYDREXPLASTEX Cables are recommended for service in a number
of environments but especially where oils and chemicals
are a problem.

CATALOGUE #1028



TIREX Mine Locomotive Cables — TIREX Mine Locomotive Cables — both single and two-conductor concentric — are approved by the Bureau of Mines and have the raised marking "P-101 BM" on their heavy-duty neoprene jackets. All TIREX Cables are cured and conditioned for service in lead.

Conductor temperature rating 75c

CATALOGUE :1011



ANNYDREX Insulated Central Cables — Simplex ANNYDREX Control, Signal and Communication Cables have an additional thickness of appropriately coded neoprene over each individual conductor, plus heavy-duty neoprene jackets. ANHYDREX insulation provides excellent signal reproduction and is exceptionally stable, even when operating with high ambient temperatures.

CATALOGUE 21028



TIREX Mining Machine and Shuttle Car Cables — TIREX Mining Machine and Shuttle Car Cables are designed for stability under today's rigorous mining conditions. The insulated conductors are "ribbed" or gear-shaped. This feature causes then to interlock with the heavy duty neoprene jacket and prevents them from slipping. Both Type W and Type G have "P-101 BM" molded onto the jacket.

Conductor temperature rating 75c

CATALOGUE \$1011



ANHYDREX XX — Simplex ANHYDREX XX is a butyl-based insulation of the highest possible quality. Because of its exceptional resistance to heat and ozone, it has general applications in circuits operating up to 35,000 volts, with permissible conductor temperatures of 90 C. to 5KV, and 85 C to 17KV — in wet or dry locations.

CATALOGUE \$1023



TIREX Bredge and Shevel Cables — TIREX Bredge and Shovel Cables are masterpieces of engineering achievement. Every consideration has been given to safety and durability. Simplex special cured-in-lead neoprene armor effectively resists all the elements normally encountered in this type of work.

Conductor temperature rating 75c

CATALOGUE 21012



CONDEX — Simplex CONDEX Cables are protected against mechanical damage by interlocked metallic armor. The armor is manufactured of galvanized steel, plain or baked enameled (colored aluminum, bronze or other metals, and can be applied over any cable core within a very wide diameter range. CONDEX Cables may be further protected by a thermoplastic covering over or under the metallic armor.

CATALOGUE \$1024



TIREX Welding Cables —TIREX Welding Cables are scientifically stranded for maximum flexibility without wrist drag. Cured-in-lead neoprene jackets provide utmost safety for both operator and bystanders.

Conductor temperature rating 75c

CATALOGUE /1011

This Month in Coal Age-Cont'd

### **►** Coal Preparation

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Entrainment Dryer at Orient No. 3 Cuts 10M Moisture Economically . . . . p 102

Employing the entrainment principle and featuring recycling of gases, inert atmosphere in the drying section and a final cooling stage, new dryer at Orient No. 3 operates on minus 10M fines. Feed rates range from 180 to 230 tph, and moisture is cut from a 12.4% average to 9.5%, or 2.9 points compared to the specification requirement of 2.5 After starting with fuel oil the dryer operates on coal dust from the separators.

Added Advantage-Low degradation rate as a result of rebuilding following initial operating trial.

### Industry Affairs

Summer Meetings ..... p 106

Open Pit Mining Association at Rolla, Mo., p 106; Mine Inspectors Institute of America at Terre Haute, Ind., p 110; Rocky Mountain Coal Mining Institute at Colorado Springs, Colo., p 116.

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### This Month

### Mining Practice

HELICOPTER HELP-The first of the "chappers" to be put into service by a coal-mining company-in this instance a stripper in hill country-has definitely proved its ability to save both managerial and equipment time. Standard or short-landing airplanes are of course already in use by a number of companies to save time in getting men, material and equipment from point to point. They require, however, fairly long and expensive strips, whereas the particular helicopter that broke the coal-mine ice can land in a 50-ft circle. Thus it can snuggle right up to the mine office, tipple or what have you, while its hovering ability is a major asset in inspection, surveying and the like.

Look for more choppers in coal in the not-too-distant future.

7% TO THE GOOD-A nickel a ton on a year's output is a prize most any coal man would welcome. It is possible to get it, or more, by proper attention to maintenance, now about the third biggest item on the average cost sheet. The steps that can be taken run from reports and records to and through salvage and rebuilding of worn parts. Anent the latter, for example, nydraulic jack pistons and other hydraulic parts now may be reclaimed by spraying them with chromium borides and carbides in a nickel matrixhot of course-at a very material saving. And anent the former, a new system of reports and records, plus a carefully devised inspection and replacement procedure, cut section maintenance cost 7% for one company, with more expected later.

Moral-The economy payoff warrants real effort to arrive at the best possible setup in maintenance.

HIGHER FACE VOLTAGES-Admittedly desirable for better machine performance and lower maintenance, higher face valtages on a routine basis are coming nearer to general use step by step. Present work on the revision of electrical standar's is one omen of a change to more practical levels. The developments of the past and those to be empected in the future in grounding and protection will solidify the gains and pave the way for industry-wide adoption. Safety also will benefit, along with cost.

ARCHES AND CANOPIES-Recent reports indicate that the yielding steel arch is doing a good job in roof support in oll works and broken ground penetrated by permanent haulways and airways. Thus it becomes a new tool for those places where conventional supports are inapplicable or unduly costly. And at the other end of the spectrum-to wit, the facepreparations are under way to give the newly developed canopy a thorough trial under operating conditions. And in addition the first installation of a British lengwall support system was nearer to U. S. installation as a result of the favorable progress of negotiations.

AND PVC-Trials of polyvinyl chloride for both cable insulation and belts continue in coal, with spotty results so far, though the good reports continue to exceed those of difficulties by a considerable margin.



### You get special technical services

### ... with Ashland Permatreat Coal Spray Oil!

- OUR HELPFUL SERVICES, including both technical and research, are available to you—from our nationally recognized specialists in oil-treating of coal.
- YOU GET REFINERY CONTROLLED QUALITY.
  With Ashland Permatreat, you're assured of
  product uniformity. Permatreat is quality controlled and carefully refined to meet the needs
  of your operation.
- YOUR COAL BECOMES WEATHERPROOF when sprayed with Permatreat. It's dustproof, waterproof, windproof and non-corrosive. Resists freezing. Eliminates frozen car pockets.
- 4 CONVENIENT SUPPLY POINTS. Large refining and storage facilities located near the coal fields assure uninterrupted supplies of Ashland Permatreat coal spray oil for immediate delivery by tank car or transport truck.

### ONE **Permatreat** MENT LASTS THE LIFE OF THE COAL!

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ASHLAND OIL & REFINING COMPANY, Ashland, Kentucky

### The Coal Commentator

#### Coal Power

"You will be interested, as I was, in some facts brought out in the several articles comprising the supplement." Thus Louis N. Rowley, editor and publisher of *Power*, another McGraw-Hill publication, introduced a full page discussion of the *New York Times* coal supplement of June 7 in his July issue. Mr. Rowley's thoughtful and thought-provoking comments to his readers are only a few among the many favorable reactions to the appearance of the supplement, sponsored by National Coal.

Goodwill is an almost priceless asset—and this one action tapped an abundance at a very low cost. So did a special coal section in the Canton (Ill.) Daily Ledger and Galesburg Register-Mail sponsored by the Illinois Coal Strippers Association, which earned a Certificate of Merit for outstanding newspaper advertising from the Newspaper Advertising Executives Association.

#### Already Started

Remotely controlled miners are a sure thing for the future, though it may be a few years before they go underground in any numbers. Yet operation from underground control stations offers the ultimate in advantages, including the very real one of near complete, if not complete, elimination of rooffall injuries and fatalities, as well as maximum output per machine and per man.

But before the present remote-control centers can be taken underground considerable redesign will have to be done. Meantime, growing thought is being given to reducing exposure to roof hazards in the operation of face machines. Ideas include roof bonding with resin or other cement and the use of canopies. In addition, at least one remote-control system has been evolved to get the operator back in a safe place away from the continuous miner in final pillar recovery (for details, see the feature elsewhere in this issue).

Coal, therefore, already is definitely started on the remote control of face equipment from underground points. It will build more rapidly on this start as time goes on.

### Computers Too

Parts and supplies must be bought when and in the quantities needed, and stored and delivered, all involving records. Even more important is attention to where and how parts and supplies are used. Otherwise proper control of supply and parts costs and of certain related costs, such as, maintenance is practically impossible.

But proper records in turn bring in the problem of preparation at reasonable cost. Where the volume is large the practical answer is the computer. Several are paying dividends for coal companies. Manufacturers, too, are among the users, the latest being Joy with a machine that can report on the status of almost every part stocked in warehouses in seven states. The key is the machine's ability to memorize 5 million numbers.

These machines, like the more familiar ones in use for many years at the face or in the pit, also contribute to minimum coal cost and maximum competitive power on the firing line.

#### Men and Words

The "Men" in this title are the mining engineering graduates of today. There is no debate as to the fact that the industry benefits from their efforts and could and should use more, even if they cost more to put on the payroll. Anent the latter, the Lehigh mining graduate of 1959 commanded an average starting salary of \$490, being outstripped only by electrical engineers and engineering physics grads (\$515 and \$525). In 1958 the mining graduate averaged \$438. But even though the price is going up, the values contributed by trained mining men are going up even faster.

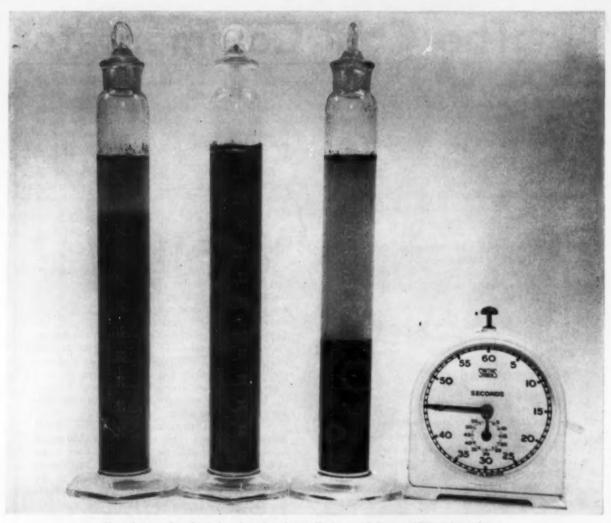
In the "Words" department you can win 60,000 Belgian francs for a paper of not over 10,000 words on coal mining, ventilation, drainage, mining explosives or preparation. It is "The Lucien Denoel Prize," named for a coal-mining professor at the University of Liege. Mail your entries, in triplicate (or requests for more information), to "Jury du Prix Lucien Denoel, c/o A.I.Lg., 22, rue Forgeur, Liege, Belgium," before July 1, 1960.

### Pay Dirt

"Tell an editor that you read his magazine only for the advertisements and you belittle him. Tell that same editor that you hang on his every word but skip hurriedly through the ads and you belittle yourself.

"The editorial pages and the advertising both are reliable sources of information and ideas. The latter supplements the former in keeping you abreast of new developments. It serves a very special function, too. It tells you who makes what—when you need the information to solve a current problem. The ads also spark ideas for the betterment of production efficiency and product quality."

Your commentator is indebted to Frank Lawler, editor of Food Engineering, another McGraw-Hill publication, for the preceding comments on the value of advertising—in Coal Age as well as Food Engineering. He offers these excerpts because he too believes "there's pay dirt for readers in advertisements," and highly commends them—in this and all other issues—to your attention.



These three graduated cylinders show the relative effectiveness of Separan AP30 (right) and another material commonly used for flocculation (left). The center graduate has had no treatment. Notice that Separan AP30 settles solids faster and clarifies water better than the other material.

### An Important Announcement From Dowell to all Coal Producers

Separan AP30®, an exceedingly efficient flocculation agent, is now being offered to the coal industry by the Dowell Division of The Dow Chemical Company.

Separan AP30 is an anionic polymer developed by Dow specifically for the flocculation of coal and clay-like slimes. In many cases, it can settle solids out of coal wash water at less than half the cost of other flocculation agents. Separan AP30 can achieve settling rates of 20 to 25 feet per hour at concentrations between 0.01 and 0.20 pounds per ton of solids. This means lower material costs and lower handling costs. Often, Separan AP30 increases the effective capacity of associated equipment without losing clarification effectiveness.

Clarification of wash water is usually so complete that contamination ceases to be a problem. In most cases, water may be used over and over in a re-circulating system without solids build-up.

Since Separan AP30 is so different from commonly used flocculants, different techniques apply. That is why Dow has appointed its Dowell Division to aid operators in engineering the best technique for each system. Use this combination of Separan AP30 and the engineering services of Dowell to help lower your coal-washing costs.

Separan AP30 is available from Dowell stations in the major coal-producing areas of the United States. For more information or consultation, contact the Dowell District office at 1918 Highway 41 North, Evansville 7, Indiana. The telephone number is HArrison 5-1353. If you wish, a Dowell Engineer will call on you promptly, without cost or obligation.

Services to the coal industry -



### Only Eaton 2-Speed Axles Have these Cost-Saving Features

#### PLANETARY GEARING

—distributes wear over four rugged, slow-moving planetary gears, resulting in lower unit stress, reduced maintenance, and longer axle life.

### SELF-CONTAINED AIR BRAKE

-makes quicker, safer stops. Simple design with fewer parts cuts relining time. Available on Eaton air brake models.

### EXTRA-RUGGED CONSTRUCTION

—of housing and all moving parts eliminates the possibility of harmful distortion or misalignment under full load; helds maintenance to a minimum.

#### FORCED-FLOW LUBRICATION

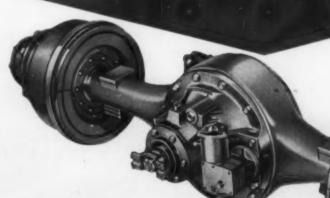
—supplies positive lubrication to all moving axle parts, even at slowest vehicle speeds. Reduces wear; cuts repair bills.

#### POWER SHIFT CONTROL

-provides quick, easy shifts. Drivers use right ratio for road and load; take full advantage of 2-Speed benefits.

### INDUCTALLOY AXLE SHAFTS

—made of alloy steel, with Eaton's exclusive method of dual-hardening truck shafts; last up to 10-times longer; keep trucks on the road.



More Than 2-Million Eaton Axles in Trucks Today

Ask Your Truck Dealer for Complete Information



EATON

MANUFACTURING COMPANY
CLEVELAND, OHIO



### Now! Dravo offers immediate delivery on open or covered hopper barges

SPECIAL STOCK BARGE PROGRAM FEATURES
DRAVO QUALITY, EARLY DELIVERY DATES

Dravo's major stock barge building program makes now an ideal time to invest in high quality, competitively priced, open or covered hopper barges.

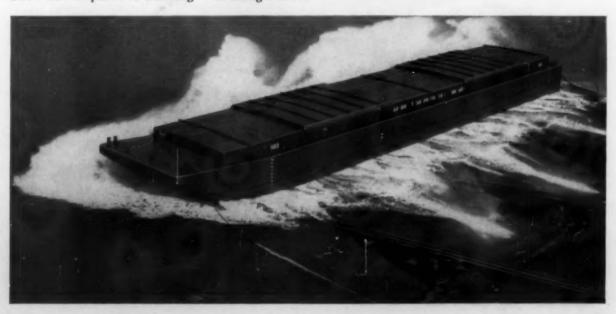
Because of this program, Dravo now has 195' x 35' x 11' barges for almost immediate delivery.

Backed by Dravo construction know-how acquired in building

more than 3,800 hulls, and model basin-tested for the best possible towing characteristics, these barges —now—can make a valuable addition to your fleet.

For full information, telephone, wire, or write Marine Sales Department, Dravo Corporation, Neville Island, Pittsburgh 25, Pa. SPalding 1-1200.

DRAVO



PROFIT NEWS FOR POWER USERS IN THE

# all purpose power line

Now you can enjoy all the benefits of GM Diesel standardization in every type of equipment and still buy the best makes of equipment on the market



GM Diesel engines are offered in more than 1800 applications of power equipment built by over 250 leading manufacturers—wider availability than any other Diesel.



Only by standardizing on GM Diesel will a user get *all* the benefits of engine standardization—for *only* GM Diesel covers the entire power range with only 3 cylinder sizes.



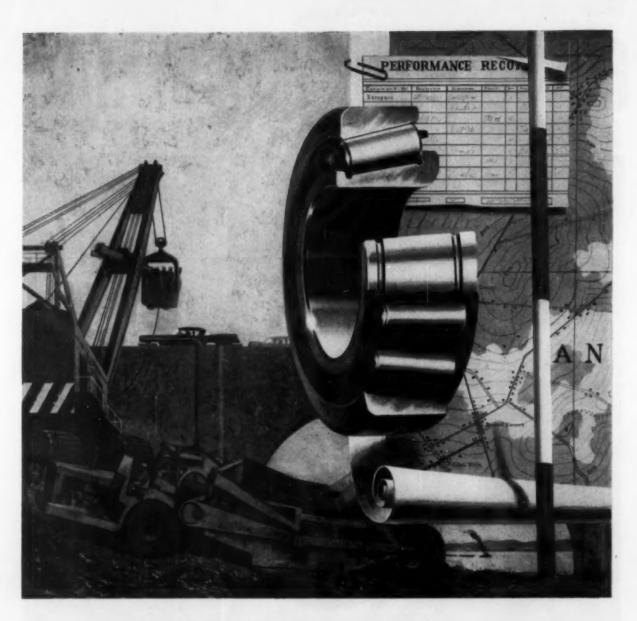
Widest parts interchangeability pays off for operators in lower parts inventory requirements—many parts for a 33 H.P. "Jimmy" Diesel fit a 1650 H.P. "Jimmy."



DIESEL

DETROIT DIESEL ENGINE DIVISION, BEHERAL MOTORS, SETROIT 29, MICH. PARTS AND SERVICE WORLDWIDE

En Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario



### Parts determine performance

Few parts make as big a difference in product performance as the bearing.

For the right bearing in the right place helps improve over-all performance — prevents breakdowns and high maintenance costs. Where can you get impartial assistance in choosing the right bearing? Call 

BSF. No other producer offers as much experience in improving product performance with bearings as 
BSF, makers of the most complete line of ball and roller bearings.



### No welding necessary



just drill, then hammer





Drill two holes, insert the terminals, hammer in the wedge — your Tigerweld Wedge-Type Bond is installed. There is no precision drilling or welding to do. To remove them, drive out the wedge. They can be reclaimed and used again and again.

Although it takes but a few minutes to install, the Wedge-Type Bond is built to last. The solid steel wedge holds the bond firmly in place and prevents dislodging by heavy vibration and derailments.

USS and Tigerweld are registered trademarks

These bonds are ideal for temporary track because they can be installed easily and used repeatedly. Yet they are so durable that many mines use them on permanent trackage.

NEW CATALOG—Our latest catalog gives full details on all Tigerweld Power Bonds. Write today: American Steel & Wire, Rockefeller Building, Cleveland 13, Ohio.

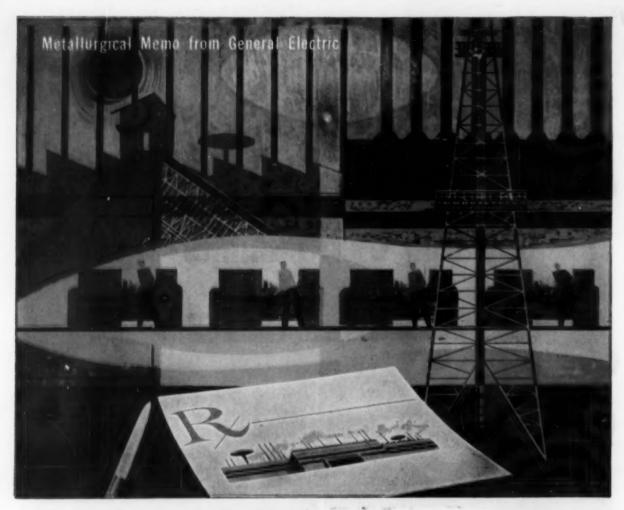


American Steel & Wire Division of



**United States Steel** 

Convention Geneva Black Division, Sex Francisco, Facific Coast Blatchbuses sancesee Coal & Iron Stelaton, Fairfield, Ma., Southern Blatchbusers « United States Steel Export Company, Statchbusers Abroad



### How Industry's "metallic vitamins" cut coal mining costs

Metallurgical Products Department reports on Carboloy<sub>0</sub> cemented carbides . . . and on two better mining bits that contribute importantly to lower cost coal mining

The very introduction of Carboloy cemented carbides—up to 50 times longer wearing than steel—reacted like a vitamin on coal production. But it remained for General Electric's coal mining specialists to come up with the bit designs that could really use them to maximum advantage.

The Carboloy CCS-2 machine bit, for example, encloses the carbide tip in steel to get maximum value from Carboloy cemented carbide's great compressive strength. It's one feason why the CCS-2 takes abuse ruinous to other bits. Another example is the Carboloy PTV style roof drill bit. Advanced metallurgical and manufacturing techniques have made possible the use of the hardest, most wear resistant grade of carbide on any standard mining tool. Result: more footage, lower bit costs.

Be sure you get the most advanced mining bits—bits that deliver more for your tool dollar—by specifying Carboloy mining tools. Your local Authorized Carboloy Mining Tool Distributor carries the complete line. Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Michigan.

CARBOLOY

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL & ELECTRIC

CARBOLOYS CEMENTED CARBIDES . MAN-MADE DIAMONDS . MAGNETIC MATERIALS . THERMISTORS . THYRITES . VACUUM-MELTED ALLOYS

Coal, Overburden or Refuse...
"EUCS" CUT HAULING COSTS



Rear-Dump and Bottom-Dump Euclids have earned their reputation for more work-ability and low cost tonnage on scores of open pit operations. Built expressly for hauling big payloads in off-highway service, they have the speed, capacity and stamina to move more tons per shift... with minimum downtime and maintenance expense.

Bottom-Dump 'Coal Haulers have payload capacities of 25, 40 and 51 tons... are powered by engines of 218 to 360 h.p. with Torqmatic Drives and standard transmissions. Rear-Dump "Eucs"—for coal, overburden and waste—are available in 10 to 50 ton capacities... have engines of 128 to 670 h.p. with Torqmatic and standard transmissions.

Euclid Scrapers and the TC-12 Crawler are top performers on stripping operations, too. They cut costs of overburden removal, building and maintaining haul roads, stockpiling, clean-up and other open pit jobs.

Check the complete "Euc" line for the advantages that apply to your operation... a Euclid dealer can show you facts and figures proof that Euclids are your best investment.

**EUCLID** Division of General Motors, Cleveland 17, Ohio







EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

Let's take a look at the facts about grinding mills

Comminution is a subject that is by no means new and perhaps more tons have been ground in discussion than in practice. But still it must be considered an art, not an exact science. Marcy realizes this as well as you do. However, we at Mine and Smelter take this art very seriously and apply as scientific an approach as is possible in recommending type. size and quality of mills for your requirements.

These Marcy Mills, whether they be rod mills with a high or low discharge level, or ball mills with Marcy grate design or the overflow type, are all "Custom Engineered" for your particular problem. There has never been a formula, capacity table, or performance curve developed which can be used to accurately select a mill for a specific job. A background of experience, applied with sound judgment, is essential for a successful solution of the problem. .. you cannot just select a size from "standard" models.

This engineering service, with final mill design based on hundreds of field-proven Marcy designs, carries no penalty in price. Of the field-proven features incorporated in the design of your Marcy Mill, many may be of recent development, some as old as grinding itself...but, the most important ingredient in the design of your mill is the extensive grinding experience by Marcy, which results in a design incorporating the correct combination of these field-proven features for your job...an ingredient which is responsible for Marcy's leadership in grinding.

What is really new in mill design? A talk with Marcy engineers will provide you with an insight on this subject, including interesting facts about the past, present and future of grinding. We at Mine and Smelter favor continual progress, but we respect history as a teacher... a most worthy instructor for guiding future progress.

"Custom Engineering" your Marcy Mill is our favorite subject...it could be yours, just contact...

# MINE AND SMELTER SUPPLY CO. DENVER 16 JROO RACE STREET 122 E. 42nd STREET LICENSED MANUFACTURERS AND SALES AGENTS in Canada, Australia, Sweden, England, South Africa SALES AGENTS in Peru, Chile, Philippine Islands, Japan, New York City (for Continental Europe) and in principal cities of the U.S.



# YOU CAN SEE WHAT MAKES ROEBLING MINE POWER FEEDER CABLE YOUR BEST BUY!

Tough, long-wear Roeprene® sheath wards off moisture, retards flame, resists oil, corrosion, abrasion. Meets flame-resistance requirements of Pennsylvania Dept. of Mines and carries symbol P-111.

All-rubber fillers for moisture resistance, splicing ease.

Tin-copper shield tape for added safety of operation.

Adequate ground wires, in contact with conductor shielding. Grounds equal more than 90% of circular mil area of single power conductor, for complete grounding and fault return.

Butyl insulation for heat-, moisture-, ozoneresistance. Rated at 90° C copper temperature through 5000 v; 85° C through 15000 v.

Semi-conducting tape around each conductor prevents excessive voltage stress and ionization between conductor and insulation.

These are features that add up to longer, better, more economical service. Even at peak loading, rugged Roebling Mine Power Feeder Cable gives peak performance!

Pride of workmanship, special design features and finest raw materials make the difference. But don't take our word for it. See for yourself. Let us show you samples and give you recommendations and details as they apply to your application. Write to Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

#### ROEBLING

Branch Offices in Principal Cities Subsidiary of The Calarada Fuel and Iron Carpon



a "ROUGHNECK" in action

...meeting the requirements of tough stripping jobs

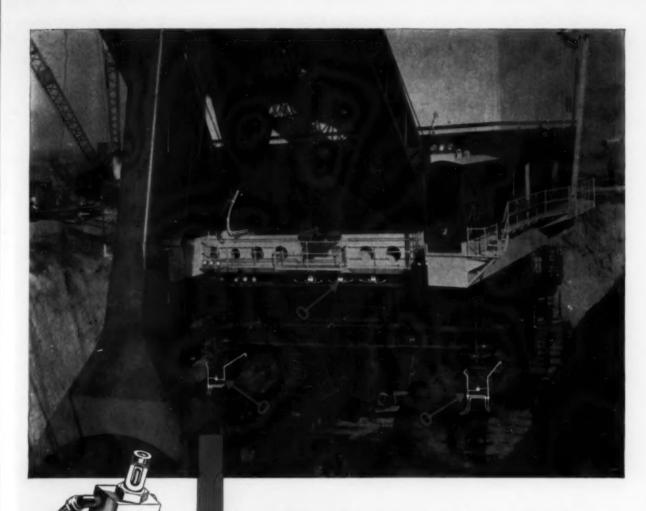
HENDRIX
Heavy Duty Mining Buckets

4½ to 14 Cubic Yards
With or Without Perforations

HENDRIX MANUFACTURING CO., Inc.



HIGHER ARCH · WIDER FRONT · TAPERED BASKET · GREATER STRENGTH



### Farval handles lubrication requirements for shovel bearings under 6,000,000 pound load

On this Marion #5760 shovel in the Midland Colleries near Victoria, Illinois, some 6,000,000 pounds rest on eight crawlers. The constant, positive lubrication required at the shovel's 336 undercarriage points is provided by a Farval air-operated system.

FARVAL

Studies in Centralized Lubrication No. 224

Another Farval system serves 115 roller circle bearings and 12 center pin thrust points through a system which can be disconnected as the points rotate.

A critical group of 33 points which move in a 165° arc and 58 other points on the huge shovel are similarly protected by modern Farval lubrication systems.

Where load pressures are high, where flexibility is required, and where lubrication without downtime is desired, Farval systems are the answer. Write today for revised Bulletin 26-S, The Farval Corporation, 3288 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



Wherever you see the sign of Farval—familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated.



### A NEW HIGH PRODUCTION TEAM FOR HIGH SEAM COAL . . . . . .

Maximum production from high seam mines requires machines designed especially for high seams. That's why Joy engineered the "15 Series."

These machines were designed to work as a team in coal 5½ feet and higher. The twin boom CD-43 drills 10 foot holes continuously with just one operator. The powerful 15-RU reaches up to 10 feet to top cut the highest of roofs. The 15-BU loads 15 tons per minute to keep up with the cutter and drill, and the 15-SC shuttle car hauls big loads fast enough to keep pace with the rest of the team. Each unit was designed with the others in mind as part of a team. To really lower cost per ton and move the tonnages expected of a high seam operation, check into Joy's new "15 Series."



15-RU CUTTER . . . it bottom cuts, top cuts, shear cuts or anything in between. For top cutting at 8½, 9½, or 10 ft.



CD-43 TWIN-BOOM DRILL . . . one-man version of the highproduction, two-man CD-42 drill. Long steels eliminate auger changes. Capacity 9 to 12 fpm, each drill.



All Joy coal mining equipment, including the "15 Series," is available with AC or DC.

### **EQUIPMENT FOR MINING**

JOY MANUFACTURING COMPANY, Oliver Building, Pittsburgh 22, Pa. In Canada: JOY MANUFACTURING CO. (Canada) Limited, Galt, Ontario

-

### JOY "15 SERIES"

CUT . . . . . . 15-RU

DRILL . . . . . CD-43

LOAD . . . . . 15-BU

HAUL . . . . . 15-SC



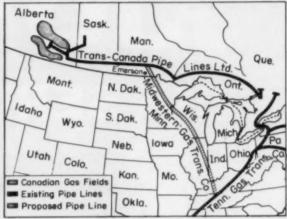
18-8C SHUTTLE CAR.... 87" high ... hould 18 ions in one load for easter, faster loading; fewer trins; cheeper houldon.

15-BU LÖADER ... lends 18 fons per minute. Model shown is 60" high ... tower model 45" high, works 84" coal.

### News Roundup



SPOKESMEN for U. S. coal interests discuss Canada's natural gas policy. They are: R. E. Lee Hall (left), general counsel, NCA; M. W. Van Scoyoc, former FPC rate expert; and J. J. McGrath, general counsel, Fuels Research Council, Inc.



AIMING at Chicago-Gary area, Midwestern Gas Transmission Co. asked FPC's license to build pipeline from Trans-Canada Ltd.'s system, starting at Emerson, Manitoba, tying into Tennessee Gas Transmission Co.'s line at Nashville, Tenn.

### From the North . . . More Rumblings on Gas

Federal Power Commission conducts hearings on renewed application by Midwestern Gas Transmission Co. to bring natural gas into the Midwest from the Alberta fields of Canada.

NATURAL GAS DRUMS are again beating loudly and persistently in the north. Canadian companies with big holdings in the gas-rich Alberta region are becoming increasingly impatient waiting for the boom which never seems to come. Now they are pressing the Canadian government for quick permission to begin exporting gas on a large scale.

Perhaps sensing the time is right for the "big push" for imports, Midwestern Gas Transmission Co., sprawling subsidiary of Tennessee Gas Transmission Co., large American gas concern, has proposed to the Federal Power Commission a \$52,297,000 pipeline that would snatch 200 million cfd of gas from the 2,300-mi Alberta-to-Niagara pipeline of Trans-Canada Pipelines Ltd., large Canadian producer, and carry it into the Chicago-Gary area.

Michigan-Wisconsin Pipeline Co., which would like to take 158 million cfd at Marshfield, Wis., has offered to build a \$24,177,000 project to transport gas bought from Midwestern. And Trans-Canada has indicated it wants to supply TGT with an unstated volume of gas on an interruptible basis at Niagara Falls.

Past Attempt—Midwestern and TGT made a similar proposal about a year ago but the FPC turned it down because Trans-Canada did not have an export permit and could not therefore meet the FPC's requirements of a guaranteed long-term supply.

Further impeding any progress towards large-scale gas movement across the border was Canada's decision to appoint a Royal Commission to study the nation's overall energy picture. The commission suggested after many months

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of study the creation of a National Energy Board to issue export as well as import permits for gas. Parliament is considering the idea now.

Acts Quickly—Trans-Canada wants to be ready to meet any and all export requirements this time. It has a permit application already awaiting consideration by the, as yet, tentative Energy Board. The final green light on exports, however, must come from the Royal Commission, which, according to some informed authorities, has tipped its hand in favor of extensive Canada-to-U. S. gas shipments. Reasons given to support this belief include these:

1. With atomic energy moving along at a slow but determined pace and promising to bid for a portion of the energy market in due time, the cry, "Keep Canada's gas for Canadians," long endorsed by many in that nation, is growing weaker. Worried producers believe if they don't sell their gas in the next 25 yr they may lose the vast profits they envision today.

2. There is increasing belief among Canadians that gas exportation could be the dynamic key to vast growth in the western sector of the country, its effects perhaps spreading throughout.

3. With 24.5 trillion cu ft of proven gas and 308 trillion cu ft potential reserves (the U. S. has 230 trillion) the Canadians are swinging with the idea that there is plenty for all.

The Big Dream-Tennessee Gas



WHYTE STRAND Wire Rope is made for a purpose...

cated and designed to provide the right combination of toughness, flexibility, and abrasion resistance to assure maximum service.

Because Macwhyte manufactures a thousand and one wire ropes, you can be sure of getting just the right rope for each piece of your equipment.

You get quick delivery, too, from conveniently located Macwhyte distributors' stocks. For best results, ask for recommendations for the correct wire rope to use on your equipment!

### MACWHYTE Wire Rope

Manufacturers of special wire ropes for strip shovels, loading shovels, draglines, shaft hoists, haulage, underground scrapers, loaders, mining machines, conveyors, car pullers, and blast hole drills.

### News Roundup (Continued)

Transmission Co. and Midwestern Gas Fransmission Co. are thinking big. Key goal would be to tie a proposed Midwestern pipeline from Trans-Canada's big system at Emerson, Manitoba, into TGT's main system near Nashville, Tenn.

Midwestern's renewed application follows recent authorization to pipe U. S. gas into the Chicago-Gary area. The authorization permitted 't to supply 360 million cfd to Peoples Gas & Coke Co., Northern Indiana Public Service Co. and Northern Illinois Gas.

With this as an appetizer, it is go'ng ahead with a plan to build 350 mi of 30-in line from TGT's main line at Portland, Tenn., to Joliet, Ill. TGT will build 167 mi of 36-in line paralleling its present lines in Louisiana, Mississippi and Tennessee to supply Midwestern with gas from the Texas and Louisiana area.

Coal's View—Coal interests have been urging Canada not to adopt a "short-sighted spendthrift policy" towards operation of natural gas pipelines. Robert E. Lee Hall, general counsel for the National Coal Association, recently told the Canadian Royal Commission, "we have an immense stake in any policy recommendations which may be made by your commission whether it affects

the disposition of natural gas in Canada or natural gas for export purposes. What you do may have a profound effect upon our interest across the border—and may vitally affect our substantial interest in Canada."

Past Experience—Other members of a U. S. coal industry team in a submission prepared for the commission cited the failure of the U. S. to establish and preserve a balanced fuel policy.

They said the failure had resulted in the extravagent waste of our natural gas resources and urged the commission to "protect the public interest by adherence to sound principles of conservation and by banning sale of natural gas below cost."

Up-shot-The outcome of the new move for gas imports may be many months away. In the meantime, NCA and other coal, labor and railroad interests are expected to step up their attack against Midwestern Gas Transmission's application to the FPC.

But those who believe gas imports are inevitable say it looks as though Canadian and American gas interests will go all out to speed things up. Canadian producers, many of which are sitting with capped gas wells and empty pockets in the middle of a potential gold mine, are looking for a brighter future. They think their production can be upped to 6 times the present amount with little add tional investment and hope much of that production will be streaming across the border.

### To Test Binder

The Kentucky State Highway Dept. has signed a \$200,000 contract with the Curtiss-Wright Corp., of Woodridge, N. J., for an extensive research program on use of coal as a binder material for roads. Pennsylvania has also agreed to experiment with the new material.

Kentucky's agreement calls for Curtiss-Wright to build and operate a pilot plant at Frankfort, the state capital. The state will build 8 to 12 half-mile test sections at various locations for testing the binder.

Based on the earl'er Rose-Hill studies, the Curtiss-Wright development envisages a binder for use in roads, airports paving and similar applications made of a combination of coal, coal-tar and tar oil, the coal dissolving or dispersing in the tar and oil. Coal represents 10 to 30% of the mixture by weight. The average 20-ft-wide highway uses around 100 tons of binder per mile.

Objectives—One aim in developing the binder is to permit its use in the standard "hot-mix" plant now widely employed. A second major objective is eliminating the disadvantages of both asphalt and coal-tar b'inders while retaining their advantages.

Asphalt binders are soluble in all petroleum distillates, including jet fuel, which limits airport use. They have poor adhesion to aggregates and poor resistance to water, are subject to adverse changes as a result of aging, have poor skid resistance and are not self-healing. But asphalt is low-cost, widely available in large volume and is relatively little affected by temperature changes.

Coal-Tar Qualities—Coal Tar is less suitable for use in the usual hot-mix plant, is higher in cost and is more affected by temperature changes. However, it has a high degree of insolubility in petroleum distillates, a high degree of adhes on to aggregates and extreme skid resistance. It stands up well in the presence of water and is not subject to age hardening.

With the new digestion process Curtiss-Wright believes it can retain most of the advantages and contrariwise eliminate most of the disadvantages. In

(Continued on p 56)



"WORLD TRAVELLER" lolls at dockside waiting to move onto the high seas with its record-breaking cargo of coking coal destined for Brazil. The coal was mined at Eastern Gas & Fuel's Kopperston mine.

### Record Shipment Headed for Brazil

New records in coal shipments have been set in North and South America by a cargo of coking coal produced at the Kopperston, W. Va., mine of Eastern

Gas & Fuel Associates, says the firm.

Headed for Brazil, the cargo consisted of 23,298 net tons of coking coal carried by "S. S. World Traveller" of

Transoceanic Marine, Inc., from Hampton Roads, Va. The coal was brought by the Brazilian National Steel Co., Rio deJaneiro, for use in its Volta Redonda steel plant, and was one of the first shipments on a new two-year contract under which Eastern will supply over 1,100,000 net tons.



### How to chalk up a million

the record of one Goodman Continuous Borer over a period of four years and five months on both solid and retreat work in the Pittsburgh #8 seam. In all this time it has not been necessary to schedule a major overhaul. The same borer on retreat work has produced a total of 2584 tons of coal in three consecutive shifts with a seven man crew. Average tonnage was 861.3 per shift or 125 tons per man . . . typical of several Goodman borers at this operation.

1½ million tons—no overhaul. At a mid-west property, six Goodman borers mined almost 1,500,000 tons in one year—this despite one borer out of service for several months after being buried in a slate fall and the production of two others adversely affected by severe roof conditions. Not one of the borers had been scheduled for a major overhaul after more than two years of operation. One of the borers with crew of eight cut and loaded, on retreat work, a total of 2403.3 tons . . . 1159.8 on the day shift, 1243.6 at night. Average tons per man was 143.7 (day) and 155.3 (night).

High tonnage—low down-time. The combination of high tonnage and low down-time is built into every Goodman borer. It keeps men and machine at the working face—produces more coal with less supervision, and makes the capital invested look better with each production report. Details of other profit making Goodman borer installations available on request. There's no obligation.



Goodman Type 425 Borer with variable cutting height of  $5\frac{1}{2}$  to  $7\frac{1}{2}$ . Type 300 available for seams 4' to  $5\frac{1}{2}$ .

22499

### *GOODMAN*

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES . CONVEYORS . LOADERS SHUTTLE CARS . LOCOMOTIVES . CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

### People in Coal



### Life of Accomplishment

RETIRED early in 1959 but still interested in coal after over 50 yr in the industry, Raymond M. Davis, of Morgantown, W. Va., was singled out for honor once again in July when Senator Jennings Randolph (W. Va.) received permission to read a summary of his career into the Congressional Record.

Born and raised on a farm, Mr. Davis' formal schooling ended at the age of 15. In 1905 he married Fannie Wilson and moved to Los Angeles where he worked as a streetcar conductor. Two years later, anxious to enter the coal industry, he returned with his wife to West Virginia, taking a job as a train dispatcher on the Morgantown & Kingswood Ry.

Each month he saved a little from his \$50 salary and in 1915 he quit the railroad and leased 10 mines near Morgantown. As business became profitable he bought some acreage along Scotts Run of the Monongahela R. R., opened a new mine, and launched himself on a bigger scale in the industry.

His fortunes were on the upgrade when the depression struck. "I lost every cent—including our home and furniture," says Mr. Davis. Though many other coal men were going into bankruptcy, Mr. Davis, guided by belief in the coal industry's future, leased the Bunker mine, in Morgantown, and built it up into a profitable producer, finally purchasing it in 1935 and using it as a nucleus for the development of other properties in the Scotts Run area of northern West Virginia.

Retired last year, Mr. Davis once presented his views on world peace to the House Foreign Affairs Committee. The late Representative Charles Eaton of New Jersey declared after he finished: "Mr. Davis, you may be unschooled as you tell the committee but you are certainly not uneducated. That is one of the finest documents I have ever listened to."

Mr. Davis is the author of several books, one of them being "Proposed New International Order," read by students of government throughout the world. In 1945 he published "Constitution for a United Nations Government," which was approved at the San Francisco United Nations conference.

Senator Randolph concluded in his article about Mr. Davis that he "chose to cram each one of his days full of constructive action to back up his beliefs. Result—a life of accomplishment."

John N. Crichton has been elected executive vice president of Johnstown Coal & Coke Co. In his new position Mr. Crichton, formerly vice president-operations, will serve the company in a broader capacity than heretofore.

Frank L. Gaddy, 37, has joined the Coal Development Dept. of the Chesapeake & Ohio Ry. Co. as mining engineer with headquarters in Huntington, W. Va. Mr. Gaddy, a graduate of Virginia Polytechnic Institute, holds a B.S. and M.S. in mining engineering. He spent 5 yr with Warner Collieries Co. and was with the U. S. Bureau of Mines during the last 6 yr as a health and safety engineer and coal mine inspector, at Norton, W. Va. He is a member of the American Institute of Mining, Metallurgical & Petroleum Engineers, Mine Inspector's Institute and several other mining organizations.

James R. Lilly, 32, has been promoted to mining engineer in the Coal Traffic & Development Dept. of the Chesapeake & Ohio Ry. Co., with offices in Huntington, W. Va. A graduate of West Virginia University, he was employed by the Monongahela Valley Engi-

neering Co. before joining the C&O organization. A veteran of World War II, he is a member of the West Virginia Coal Mining Institute, Kentucky Mining Institute and is active in the Boy Scouts.

Cletus A. Broecker and Roy E. Dean were elected vice presidents of Ayrshire Collieries Corp., Indianapolis, Ind., at the July 21 meeting of the board of directors. Mr. Dean was formerly assistant to the president, and Mr. Broecker was executive assistant.

Mr. Dean joined the Ayrshire organization in 1946 and was named assistant to the president in 1951. He is vice president and director of Frontenac Coal Corp. and a director of BCR, Inc. Among other posts held by Mr. Dean are director of Indiana Coal Association and member of the Coal Economics Committee of National Coal Association.

### **Obituaries**

Gilbert S. McClintock, vice chairman of the board, Glen Alden Corp., Wilkes-Barre, Pa., died June 18 following a heart attack. Mr. McClintock received a law degree from the University of Penn-

sylvania law school in 1912 and had practiced in Wilkes-Barre since that time. He became a director of Lehigh & Wilkes-Barre Coal Co. in 1919, remaining on the board upon the formation of Glen Alden. When Glen Alden and List Industries merged earlier this year, Mr. McClintock was elected vice chairman. He was at the time of his death a trustee of Wilkes College and had been a trustee of Bucknell University from 1933 to 1950. He was also president of the Wilkes-Barre Boy Scout Council from 1916 to 1925. For 21 yr, until 1958, he was chairman of the Wilkes-Barre City Planning Commission. In 1948 he wrote a history of northeastern Pennsylvania, the area which encompasses the anthracite region.

James G. Kidwell, secretary, Blaine Coal Co., Fairmont, W. Va., and president, Haywood Coal Co., Dola, W. Va., until Haywood's TenMile mine was sold in 1955, suffered a fatal heart attack recently at the age of 71. Mr. Kidwell's first employment was with the Baltimore & Ohio R.R. He later entered the coal business at Fairmont with Continental Coal Co. He was a staff member of National Bituminous Coal Commission and was secretary of Blaine since 1941.

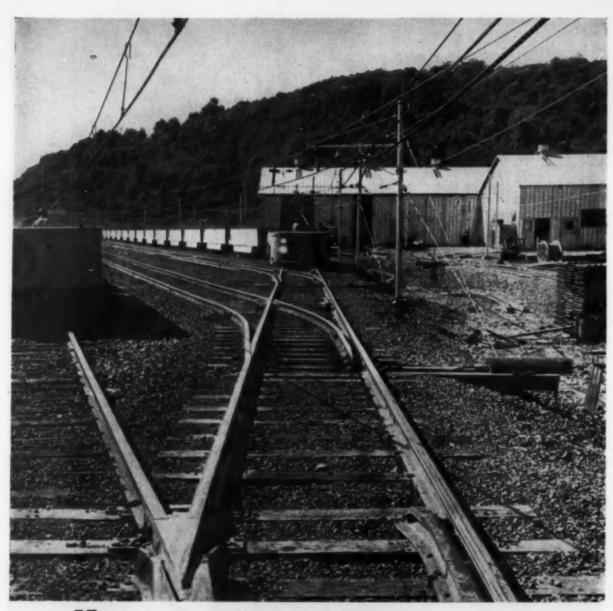
On rock jobs that rip the hide off ordinary tires—and tear the heart out of profits—you'll move more tonnage with far less delay when you shod your trucks with stronger, safer, NYGEN\*-built

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Bethlehem engineers helped build this job for a West Virginia mine. Started right in on the ground floor and planned the layout to the owners' anticipated needs. Followed through on making the rail, the frogs, the guard rails, every last spike and splice bar. Then the components were preassembled at our plant to make installation easy at the site.

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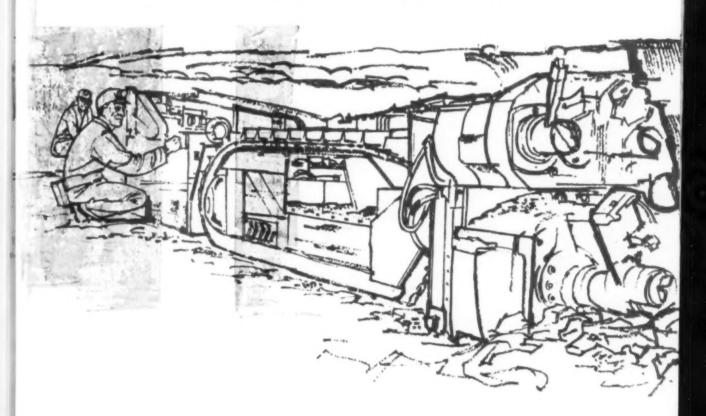
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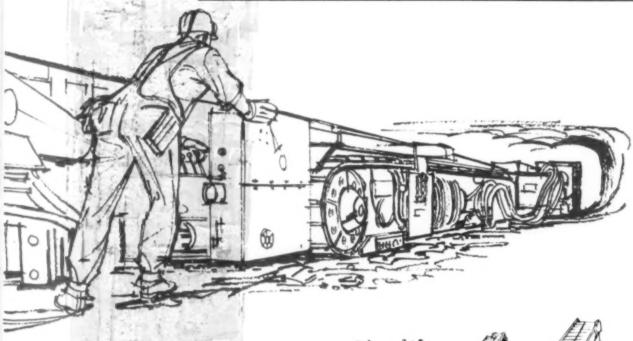


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Maximum mining height	44"	60"	77"	96"
Minimum mining height	28"	38"	501/2"	67"
Width of cut	14'-7"	9'-8"	10'-934"	10'-93/4'
Minimum tramming height	251/4"	341/2"	483/4"	63¾"
Width over crawlers	10'-01/2"	72"	77"	77"
Length ,	34'-3"	29'-51/2"	33'-10"	33'-10"
Tramming speed (feet per min.)	22'	20'	20'	20'
Feed speed (inches per min.)	0" to 51"	0" to 36"	0" to 36"	0" to 36"
Electric motors (total HP)	190	150	190	250
Weight-approx. (lbs.)	92,000	56,000	73,000	75,000

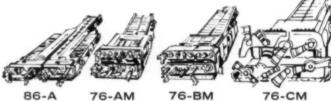
Voltage: Colmols can be built for operation on any of the following voltages: 250 V or 500 V, DC; 440 V, 3-ph, 60-cy., or 415 V, 3-ph, 50-cy., AC.

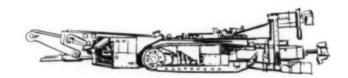


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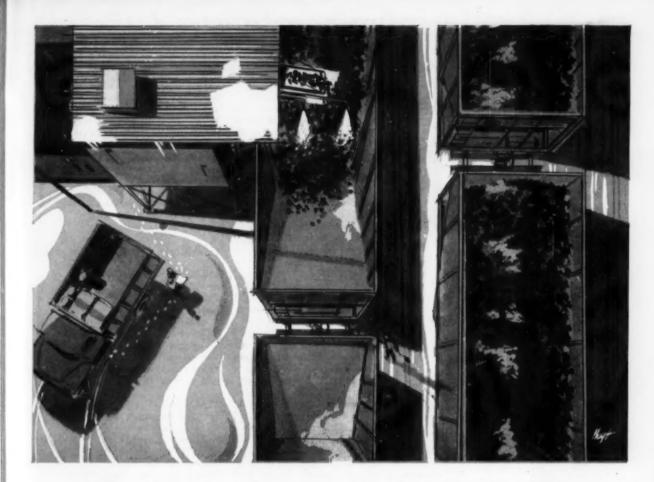
CONTROL — Col mol mining is controlled mining. The operator is in full command, gets smooth, immediate, positive response from electric-hydraulic controls...centralized for convenience, safety, easy access...located so that the operator has an unobstructed view of cutting and discharge operations...minimum operator fatigue.

rates vary with hardness of coal, impurities in the seam, condition of roof and floor, as well as other factors. Colmol's boring principle of cutting and breaking while advancing in the coal with a minimum of waste motion, assures highest loading rates with maximum face time. Want highest possible tonnage? Then you want Colmols!









# New Morton "Formula 5" with rust inhibitor protects your coal and your equipment

### Now more economical than ever to use!

"Formula 5" is the safest, most effective freezeproofing compound you can buy. It is specially made to meet the requirements set up by coal producers. "Formula 5" features a rust inhibitor and a new easily distinguishable blue color.

Unlike ordinary freezeproofing compounds "Formula 5" has a rust inhibitor added to protect you and your customers against corrosion of cars, motors, conveyors and other equipment.

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"Formula 5" is easy and economical to use.

In addition to being a multi-purpose freezeproofing compound, "Formula 5" needs no mixing, no special handling. It won't cause costly delays by caking or lumping in feeders. It's a free-flowing product composed of chemically treated sodium chloride (30-70 mesh) and a special, new improved anti-corrosive compound. Just apply dry, direct to coal.

"Formula 5" is treated to produce an ideal dissolving rate so that little of it is lost during initial drainage. This means more effective, more economical freezeproofing.

Send for free booklet, "The Key To Low Cost Effective Freezeproofing." If you would also like a Morton Consulting Engineer to assist you with freezeproofing and equipment maintenance problems, without cost or obligation, write:



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### Coal Abroad

### RUSSIA

Ou.lining the tasks of the Soviet coal industry in the newly-published Sevenfear Plan, planning chairman Ya. M. Fedyayev stated that during the next 7 yr, total Soviet coal output must be increased by 100 million metric tons.

The largest part of this all-Soviet output increase is to be achieved by the Russian Federation, which now produces 60% of the U.S.S.R.'s total coal.

The major increase trends deal with higher coking-coal yield from the Kuznetsk Basin and drastic expans on in open-pit coal mining, primarily in Siberia.

The present output of open-pit mines -30% in the Russian Federation-is 5 times as productive as sub-so 1 mines, and cost is two- to three-times lower.

An all-out effort is to be made to mine all coal qualities available, the low-caloric types to be used in thermal power plants. The abundance of openpit coal, together with low initial investment cost for giant-s'zed electrical machine sets, will permit production of current at a rate equal to the cost of hydro-power electricity, but at much lower investment cost and at raster construction speed.

On the technical side, the hydraulic coal production method, applied now only at one mine in the Kutznetsk Basin, is expected to spread to more than 12 mines, resulting in greatly reduced production cost of coal.

### Overseas Flashes

JAPAN—Scientists in this nation have developed an anesthetic from coal. They isolated the new drug from quincline, an organic base formed from an line, a byproduct in the process of tar extraction from coal. Chief remaining problem is to ascertain whether its secondary effects are harmful to human bodies.

CZECHOSLOVAKIA—This country is recruiting soldiers to work in the coal mines. Anxious to get 20,900 new workers this year, of which 8,850 are to be sent to the Ostrava-Karvinia coal district, the government has decreed that soldiers of the second year of their 2-vr military requirement can be released immediately from the army if they sign up for the coal mines. Results have been meager so far, say reports, mainly because soldiers who would consider going to a mine for 1 yr fear they will not be permitted to return to their original occupation or to school.

GREAT BRITAIN-British Petroleum Co.

has an idea for preventing emission of smut from industrial boilers. By insulating a metal chimney with an aluminum shield, temperature in the chimney is maintained high enough to prevent an acid layer and smut from forming, the company says. During experiments it was shown that acid deposited on metal chimney walls causes corrosion. Soot and other solids stick to the acid and build up a layer which periodically flakes off into smut that is carried out of the chimney by flue gases.

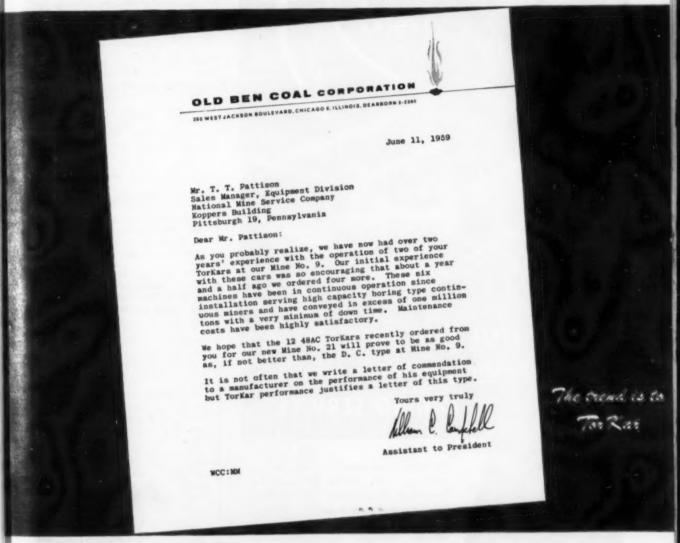
POLAND—In spite of overproduction of coal in western Europe this year, Poland will sell some 16 million tons of hard coal and 6 million tons of brown coal. Poland exports coal to 20 West Europe nations. Also this year, Poland will sell 8 million tons of hard coal, 6 million of brown coal and 2 million tons of coke to eastern European nations, primarily East Germany. Long term contracts for Polish coal have reportedly been signed with Austrian railroads.

ITALY-During its last session the Italian Coal Committee of the Ministry of Industry and Commerce set Italy's requirements of coal for the third quarter of 1959 at 2,440,000 metric tons, including 850,000 metric tons of metallurgical coke and 220,000 metric tons of gas coke. The metallurigical and gas coke w'll be supplied by national production while the balance of 2,280,000 metric tons will be imported, reported the committee.

SWEDEN-The National Research Institute in this country reports development of a system that sounds an alarm shortly before certain types of explosions occur. Tests show the device is capable of detecting the rap d pressure rise occurring in the initial stages of an explosion. Secondary detection is made by by a platinum wire carrying an electrical current whose resistance will alter as explosive gases come in contact with the wire. The system can be coupled to fire-quenching devices, and units which automatically cut off electric current.

FRANCE—This country must coordinate its energy production or else competition among coal, oil and natural gas will cause economic and social disorder, said Alexandre Verret, president of Charbonnages De France, the national coal authority. Now is the time, he stressed, for the government of France to set long-term objectives for energy production, giving coal its "rightful place as a plentful, competitively priced source of energy."

# A recent communication\* of exceptional interest to SHUTTLE CAR BUYERS and USERS





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RUSSIA-Six million metric tons per year of coal are expected from the Charkov coal center, now under construction in this nation. Besides coal, the mine is to yield unburnable matter to a construction materials combine being built near the mining site. Fully automated, the new mine is expected to employ 36 of the manpower needed at comparable-sized old-type mines in the USSR. Machines will be remotely controlled with a small T. V. camera-relay system.

HOLLAND—The Netherlands State Mines have budgeted for 1959 27 million guilders for purchasing coal fields on the border between the Netherlands frontier and the West German towns of Wegberg and Bruggen. Over 200 million guilders (about \$52.3 million) will be invested in new mines.

### Meetings

International Briquetting Association, Briquetting Conference, August 24, 25 and 26—Glacier Park Lodge, Glacier Park, Mont.

Short Course in Coal Mining, 47th annual meeting, July 6-28—School of Mines, West Virginia University and Mullens, W. Va.

Electricity and Equipment Maintenance Short Course, 7th annual meeting, July 6-28—Gary High School, Gary, W. Va., and Shinnston Grade School, Shinnston, W. Va.

First Bienniel West Virginia Mining & Industrial Show, sponsored by the Charleston Chamber of Commerce, Sept. 23-25—Charleston, W. Va.

Exploration Drilling Symposium annual meeting, Oct. 8-10—Penn State University, University Park, Pa. Sponsored by mining departments of Penn State, Colorado School of Mines and the University of Minnesota.

Meeting of Pittsburgh Section of American Institute of Mining, Metallurgical & Petroleum Engineers and Pittsburgh Section of National Open Hearth Committee, Nov. 8, Penn-Sheraton Hotel, Pittsburgh, Pa.

American Institute of Mining, Metallurgical & Petroleum Engineers, Inc., annual meeting, Feb. 14-18, 1960— New York, N. Y.

American Mining Congress, Coal Div. meetings—Huntington, W. Va., Aug. 11-13; Evansville, Ind., Aug. 25-27; Terre Haute, Ind., Aug. 28. Themes include haulage, roof control, etc.

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# A MAJOR BREAKTHROUGH IN FINE COAL CLEANING

The Dutch State Mines

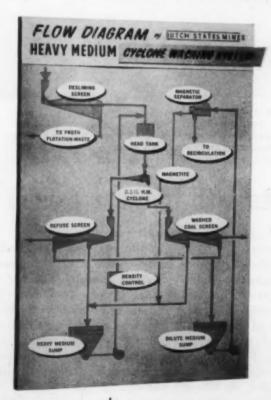
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The completely new heavy medium cyclone washing system is now, for the first time, available to coal producers in the United States—and exclusively through Roberts & Schaefer.

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You can make an effective separation anywhere in the specific gravity scale and produce the quality coal your market demands.

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Okocord Red Saddle twin Type W cable in action on loader and shuttle car at Intermountain Chemical Company's trona mine. Secret of Red Saddle's added strength and security against short circuits is the pre-formed, red neoprene protective wall between the conductors, and the compact construction in which all components are locked together for maximum ruggedness.

### They've cut mining costs with tougher cables

"We've found that the longer life of Okocord cables means lower operating costs for us," says Jack Wilson, Maintenance Supervisor for Intermountain Chemical Company of Westvaco, Wyoming. "Our mining operation is almost 100% electrified. We need cables that can stand up to extreme abuse. Okocord mining cables have everything it takes to prevent work stoppages that waste man hours or immobilize expensive equipment." They're tough, highly

flexible, and unaffected by oils, acids, alkalies or mine water.

On its shuttle cars—key to continuous, efficient operation—Intermountain finds that Okocord Red Saddle twin cable stands up best to high-speed reeling and unreeling... to being stretched tight against sharp tunnel wall corners... to frequent cable runovers... and to pulling and stretching. Says Mr. Wilson: "Okocord Red Saddle shuttle car cable minimizes internal shorts due

to cable abuse."

There are Okocord quality cables to keep your mining equipment operating efficiently: shovels, drills, cutting equipment and other machinery. There are Okonite specialists ready and willing to help you in planning new cable systems. And there is an illustrated, 76-page booklet on mining cables that's free when you write for Bulletin CA-450, The Okonite Company, Passaic, New Jersey.



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### **Current Coal Patents**

By: Oliver S. North

Mobile curvable conveyors, J. M. Hill, June 16, 1959. Des gn for a mobile curvable conveyor for delivering coal from a continuous mining machine to a standing conveyor. The elements can be superimposed piggy-back fashion. No. 2,890,788.

Means for attaching cutter picks to their supports, A. Partington and R. L. J. McRae (assigned to Coal Industry (Patents) Ltd., London, England), June 16, 1959. Improved means are provided for attaching cutter picks or other tools to their supports in coal mining machines; the supports may be either chains, discs, drums or blades. No. 2,890,873.

M'ne roof bolts and hangers, A. H. Genter, June 23, 1959, Design for a double-headed roof bolt for removably supporting a hanger having a socket that slips over a head of a mine roof bolt. The hanger is used for hanging pipe and cable in mine passages. No. 2,891,752.

Long wall mining apparatus having a seam embracing channel, R. Milik, June 23, 1959. Improved apparatus for both advance and retreat methods of mining coal, part cularly thin seams. Cutters are provided for mining the whole of an extended area or length of the seam face (of whatever thickness). The articulated apparatus advances towards the working face in a convex curve created by this mode of working, which is designated as "arc-face" mining. No. 2,891,778.

Strand supported belt conveyor with tens'on determining means for the supported strands, R. A. McCallum (assigned to Goodman Mfg. Co., Chicago, Ill.), June 30, 1959. In a method for prestressing support cables of a flexible strand conveyor, the stressing is effected by visually observing the action of a prestressed spring disk and adjusting the nut or turnbuckle bearing against the disk. No. 2,892,532.

Troughing roller assembly for belt conveyors, R. F. Lo Presti (assigned to rollers. U.S. Patent No. 2,892,533.

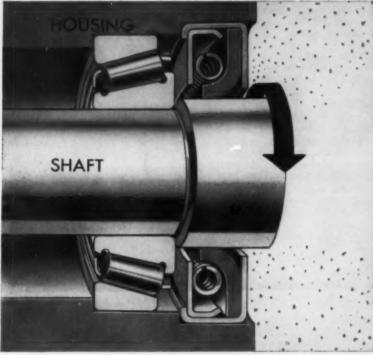
Conveyor belt training assembly, C. T. Ogden (assigned to Goodman Mfg. Co., Chicago, Ill.), June 30, 1959. Training assembly for a flexible strand sideframe conveyor which is entirely supported on the sideframes and is thus free to deflect up and down with the strands under varying loads and at exactly the same rates as the strands themselves. Need for a vertical rock shaft is eliminated. No. 2.892.534.

Blast hole loader and tamper, H. S. Payne, July 7, 1959. A mobile apparatus for loading and tamping side-wall blast holes during strip min'ng operations includes a jointed ramrod with associated drive means for propelling it into the hole, means for storing the ramrod when in retracted position, and means for supporting and aligning the ramrod over the hole. Only one man is required for operation. No. 2,893,285.

Portable extensible belt conveyor, G. Baechli (assigned to Joy Mfg. Co., Pitts-



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Oglebay, Norton Mine Supply Div.,
Offices: St. Clairsville, Ohio;
& Johnstown, Pa.

Persinger Supply Co., Williamson, W. Ve. Persinger's Inc., Charleston, W. Ve. Union Supply Co., Denver, Colorado U. S. Steel Supply Co., Pittsburgh, Pa. W. B. Thompson Co., Iron Mountain, Michigan



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A truly portable bondwelder built as GUYAN builds everything — RUGGEDLY — to stand up under the roughest use.

Ideal for rail bonding, general intermittent welding and similar work. It will develop 80 to 200 amperes in six proportioned taps. These quick-change tapered plug-and-socket taps assure rapid, easy selection of the proper welding current.

Thin design permits easy removal from cars. And this GUYAN Bondwelder is so easy to handle even in low coal! Haul it from job to job . . . easily and quickly . . . and put it to work immediately.

Guyan BOND WELDERS Don't forget — whether you need a welder for rail bonding, repair jobs in the shops or special welding — there is a GUYAN Bondwelder to meet your requirements.

GUYAN MACHINERY CO.
LOGAN, WEST VIRGINIA

#### Coal Patents (Continued)

removal of such belt sections. The number of extensions is held to a minimum. No. 2,893,539.

Apparatus and method for centrifugal separation, R. Teuteberg (assigned to SKB Schuchtermann & Kremer-Baum A.G. fur Aufbereitung, Dortmund, Germany), July 7, 1959. Method and apparatus for working up coal in heavy liquid which permits the use of centrifugal force without difficulties due to eddy currents as in cyclones or nozzle throttling as in jet centrifuges. No. 2,893,557.

Cutter bit holder, S. E. Proctor (assigned to Austin Hoy & Co. Ltd., High Wycombe, England), July 7, 1959. As a means of reducing the time required to change picks in cutter boxes, the picks are provided with screw-threaded shanks rotatably mounted in the boxes. A pick may be locked in one of at least two selected positions, thus enabling the pick to face in either direction of movement.

### **Equipment Approvals**

Seven approvals were issued during June.

The Long Co.—Type 188-E loader with PT-118 or PT-218 Piggyback conveyor; three motors, one 40 hp and two 5 hp, 550 V, AC. Approval No. ?F-1475A, June 2.

The Long Co.—Type D-3510 battery-powered utility truck; two motors, each 5 hp, 96 V, DC. Approval No. 2F-1476, June 3.

Columbus-McKinnon Chain Corp.
—Model RF-57 ratio feeder conveyor;
one motor, 20 hp, 230 V, DC. Approval No. 2F-1477, June 8.

U. S. Pipe & Foundry Co.—Type 5SC-7BE rebuilt Joy cable reel shuttle car; three motors, two 10 hp, and one 7½ hp, 250 V, DC. Approval No. 2F-1478, June 9.

Mine Safety Appliances Ce. — Bantam rock dust distributor; one motor. 2 hp, 415 V, AC. Approval No. 2F-909A, June 11.

Manson Machine Co.—Timbering machine No. TR6959; one motor, 20 hp, 440 V, AC. Approval No. 2F-1479A, June 29.

Cool Age, McGraw-Hill Publishing Co.—Type BM-P3 photoflash unit. Approval No. 29A-6, June 30.

# DENVER

\*PATENTED

### from DENVER...

a specially engineered DUPLEX Cyclone Classifier that -

(1) Produces Cleaner, Higher **Density Sand Product** 

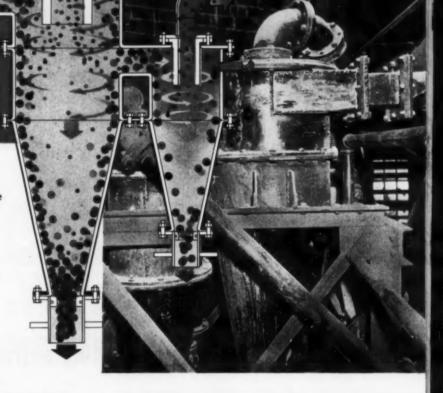
> than is possible with single-stage conventional wet cyclones.

(2) Is Self Regulating

-handles surges or peak flows that would plug conventional wet cyclones.

(3) Uses Water to Wash **Slimes From Sand** 

> to give sharp separation, clean, slime-free product.



Complete details on the DENVER-Morton Duplex Cyclone Classifier will be sent to you on request. Write today!



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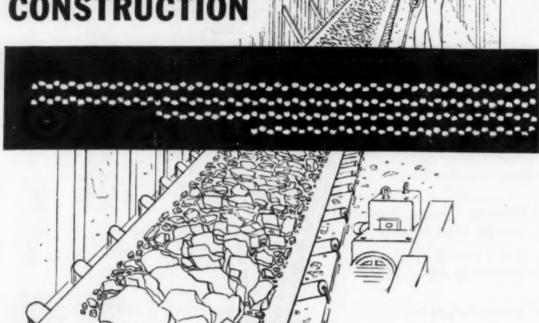
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# EXCLUSIVE "COLEDGE" CONSTRUCTION



# gives Thermoid Conveyor Belting extra life where it counts

Punishment at the edges—especially the tough use dealt out in mining—can kill most conveyor belting in a fraction of the time that Thermoid-Quaker Conveyor Belting lasts. The unique "COLEDGE", though, available on all grades of Thermoid-Quaker Conveyor Belting, puts more rubber where it's needed, makes a more flexible and wear-resistant edge where the abrasion is greatest. Tests show Thermoid-Quaker Belting with "COLEDGE" construction lasts and lasts on the same jobs where other belting fails.

What's more, all Thermoid-Quaker Conveyor Belting is *prestressed* in manufacture, so that the belt is actually in compression when you get it—ready for the heaviest load without strain.

Examine Thermoid-Quaker Conveyor Belting with the exclusive "COLEDGE" construction at your Thermoid distributor's, or write for further information to Thermoid Division, H. K. Porler Company, Inc., Tacony & Comly Sts., Philadelphia 24, Pa.

THERMOID DIVISION



H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Capper and Alloys — RIVERSIDE-ALLOY METAL DIVISION; Refractories — REFRACTORIES DIVISION; Electric Furnace Steel — CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY DE MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Repoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.



Equipped with free-cutting Kennametal\* U7J and J2 style bits, this Jeffrey Colmol loads a 2½-ton shuttle car in 30 to 40 seconds.

# "Sure, bit costs are important . . . but it's tonnage that pays the bills"

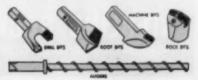
Bit-cost-per-ton is at a new low but this company† buys Kennametal Bits primarily because of the way they cut coal

In Indiana County, Pennsylvania, the Miller "B" Seam averages 42 inches, and is characterized by a sulfur streak in the middle. This streak varies anywhere from a feather to about two inches thick. While the roof is fairly good, frequent bottom rolls of hard fire clay extend from 4 to 22 inches up into the bed. Under these conditions, the company had difficulty finding a long-lasting bit that would satisfactorily "Trademark" (Clymer No. 2 Mine, Morriadale Mining Company

cut this seam. Not only did the machine have a slow rate of advance, but the heavy strain on the cutter heads resulted in an excessive power load. Then the company tried Kennametal Bits and not only obtained good production but relieved the excessive strain on the machine.

Ask your Kennametal Representative how Kennametal cutter bits and drill bits can improve your production. Let him help you select and actually test in your mine the Kennametal Bit designed to match your operating conditions. Call your Kennametal Representative or write Kennametal Inc., Mining Tool Division, Bedford, Pennsylvania.





### Preparation Facilities

Sahara Coal Co., Inc., Mine No. 6, Harrisburg, Ill.-Contract closed with The Diester Concentrator Co., Inc., for nine Model HCRD Concenco No. 77 Diagonal-Deck washing tables and two Concenco revolving feed distributors, Model 108.

Rochester & Pittsburgh Coal Co., Ernest mire, Ernest, Pa.-Contract closed with The Diester Concentrator Co., Inc., for four Concenco No. 77 Diagonal-Deck washing tables and 4 Concenco 2-way splitters.

Kentucky Ridge Coal Co., Crockett mine field, Bell Co., Ky.-Contract closed with The Diester Concentrator Co., Inc., for one Concenco No. 77 Diagonal-Deck washing table.

The United Pocahontas Coal Co., Crumpler, W. Va.-Contract closed with Wilmot Engineering Co. for one Wilmot Hydrotator to prepare %x0 bituminous fines; feed capacity 65 tph.

Franklin Coal Co., Ravine, Pa.-Contract closed with Wilmot Engineering Co. for the design, furnishing and supervision of installation of a new Wilmot heavy-media system with one No. 528 Wilmot-OCC heavy-media vessel to prepare stove to rice sizes of anthracite coal; feed capacity 105 tph.

Thomas W. Schneck Coal Co., Suedberg, Pa.-Contract closed with Wilmot Eng neering Co. for the design, furr ishing and installation of one Wilmot heavy-media system with a No. 528 Wilmot OCC heavy-medial vessel and one Wilmot 18x18 high-speed roll for preparing stove, nut, pea, buckwheat No. 1 and rice sizes of anthracite coal; feed capacity 105 tph.

Winding Gulf Coals, Inc., Maben, Wyoming County, W. Va.—Contract closed through J. O. Lively, Contractor, with Fuel Process Co. for an M6-1-36 heavy-media washer, prewet screens, drain and rinse screens, sumps, hoppers, piping, flumes, chutes and other preparation equipment to handle 150 tph of 3/16-in plus coal. Completion scheduled about Sept. 1, 1959.

Columbia Geneva Div. of U. S. Steel, Wellington, Utah-Contract closed with the Ducon Co., Inc., for high efficiency cyclones to be used on a Dorr-Oliver FluoSolids dryer.

Jewell Ridge Coal Co., Ky.-Contract closed with the Ducon Co., Inc., for high efficiency cyclones to be used on a Dorr-Oliver FluoSolids dryer.

Margaret Ann Coal Co., Conaway, Va.-Contract closed with the Daniels Co. for a complete preparation plant including a DMS dense-media precision coal washer and auxiliary equipment and accessories. The plant will handle coal from the Splashdam seam. Completion expected in Fall, 1959.

Vansant Coal Corp., Vansant, Va.-Contract closed with the Daniels Co. for one DMS dense-media precision coal washer and accessories to replace existing facilities. Complet'on expected around Aug. 15-30, 1959.

Red Parrot Coal Co., Mine No. 5, Prenter, W. Va.-Contract closed with Kanawha Mfg. Co. for hillside storage bin with feeders and belt conveyor for delivering to existing plant; variable capacity range between 100 and 400 toh.

Slab Fork Coal Co., Alpoca, W. Va.
-Contract closed with Kanawha Mfg. Co. for water clarification circuit comprising flocculation of froth cell tailings. Includes single-tank flocculant preparation circuit, 40 ft-dia. Dorr thickener and 6 ft x 5 disc Eimco filter.

# How to keep customers happy all winter long



Treat all shipments with Sterling Rock Salt, and your customers will be able to unload coal fast even in freezing weather. They won't have to thaw your cars or loosen coal by hand. Customers will gladly pay the small premium for coal that is treated so it won't freeze up! You can apply Sterling Rock Salt quickly, too. Just three or four bags of this effective anti-freeze agent will keep an entire carload of coal from freezing! (It takes only 5 lbs. of Sterling Rock Salt to protect one ton of bituminous; 5-8 lbs. for anthracite.)

You can also use Sterling Rock Salt to prevent frozen scales and switches . . . to keep roads and yards clear throughout the winter. It removes snow and ice fast. Comes in bulk carloads or packed in 100-lb. bags.

Free folder gives further information on Sterling Rock Salt for mines, collieries. Ask your Sterling representative or write to INTERNATIONAL SALT COMPANY, INC., DEPARTMENT CA-8, SCRANTON, PA.

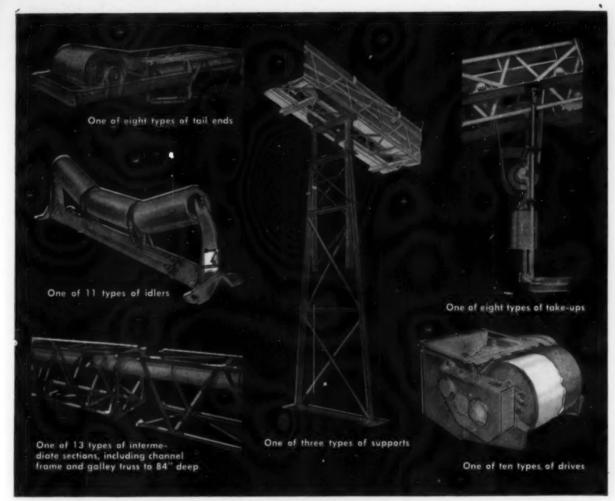
SALES OFFICES: Buffalo, N. Y. Atlanta, Ca. Baltimore, Md. Boston, Mass.

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STERLING ROCK SAI INTERNATIONAL SALT COMPANY, INC



Pictured here are just a few of the many Barber-Greene standardized conveyor components. Each is available in a wide variety of types and sizes, with unmatched flexibility for countless ways of assembly. Write for new bulletin.

### Boost conveyor efficiency and cut costs with Barber-Greene standardized components

Every year, more and more belt conveyor installations—long and short, simple and complex—are made up of Barber-Greene standardized, "packaged" components. This standardization means fast, off-the-shelf delivery... almost limitless combinations of assembly that cut time and costs on any bulk material handling job... components completely interchangeable... spare parts readily available... simple selection and pricing right from the catalog. Light or heavy, Barber-Greene has the complete conveyor installation you need.

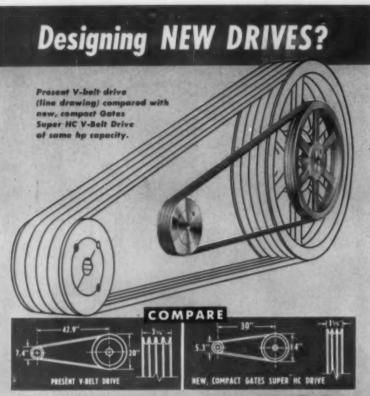
#### You save these six ways:

- \* You save special engineering time and expense.
- e You save delivery time.
- You save erection time and expense.
- . You save on alignment.
- · You save on replacement costs.
- You save down time.



38-34-PE

CONVEYORS...LOADERS...DITCHERS...ASPHALT PAVING EQUIPMENT



# Save up to 20%

with new high capacity V-belt drive

When you change the whole drive - both V-belts and sheavesremember: The cost of a Gates Super HC V-Belt Drive is as much as 20% less than the cost of present V-belt drives of the same horsepower capacity.

A development of Specialized Research in the world's largest V-belt laboratories at Gates, the new Super HC V-Belt makes possible the most compact, lightest-weight, lowest-cost multiple V-belt drive you can put on any machine!

### Cuts drive space as much as 50%

With Gates new Super HC V-Belt, sheave diameters and widths can be reduced 30% to 50%, center distances 20% and more. Bearing load is lightened and total space occupied by the drive may be cut as much as 50%.

"The Modern Way to Design Multiple V-Belt Drives" is an informative hand-book on the Super HC Drive, available from your nearby Gates Distributor listed in the Yellow Pages of your phone book.





The Gates Rubber Co., Denver, Colorado Gates Rubber of Canada Ltd., Brantford, Ont.

Gates SUPER HC Drives

### **New Books**

#### Management

Management for the Smaller Company, edited by Elizabeth Marting. A timely and comprehensive publication written by 35 executives and specialists who have successfully solved management problems. Created especially for companies with fewer than 1.000 employees, this book shows how a smaller company can build a reserve of managerial talent; how it can plan for future opportunities; what it can do about specific problems in finance, marketing and manufacturing; and where and when to look for resources outside the company that can be put to work. Sprinkled throughout the text are many examples of specific problems solved by good management techniques. 399 pp. 6x91/2-in; cloth. \$6; AMA members \$4, American Management Association, Inc., 1515 Broadway, New York 36, N. Y.

### Technical Writing

Successful Technical Writing, by Tyler G. Hicks. Whether you are an established technical writer seeking to improve your skills or an engineer, scientist or technician who has not yet written, you will find this book useful as a guide to better writing. Explaining in detail how to go about a writing job, it tells where to look for ideas, how to evaluate them, how to build an idea into an outline, how to write up the idea and how to work with editors and publishers in getting the idea in print.

The book includes much practical working information, such as how many pages of typewritten manuscript might be needed for a specific job, how many illustrations should be used and where to get them. Examples from published material are used to help explain important points. 287 pp. 5%x8-in; cloth. \$5.50, McGraw-Hill Book Co., Inc., 327 W. 41st St., New York 36, N. Y.

#### How to Metallize

Metallizing Handbook is a completely new volume containing how-to information on all phases of modern metal and ceramic flame-spraying, including the latest developments in spraying, in powder form of high-melting-point ceramics, such as alumina and zirconia, and hard facing alloys including tungsten carbide. It provides engineering data on physical properties of sprayed metals and ceramics bond as well as tensile strengths, hardness, spraying speeds and other coating characteristics. Data also are included to aid in estimating costs. 345 pp; cloth. \$5, Metallizing Engineering Co., 1101 Prospect Ave., Westbury, N. Y.

#### Coal Technology

Plastic Properties of Coal, by E. D.

Pierron, O. W. Rees and G. L. Clark describes tests made on two coals to determine what characteristics are responsible for plastic properties. The report includes experimental procedures, results and conclusions. 36 pp. 6%x10-in; paper. Circular 269, Illinois State Geological Survey, Urbana, Ill.

Synthetic Liquid Fuels From Hydrogenation of Carbon Monoxide, (Part II) by J. F. Shultz, L. J. E. Hofer, E. M. Cohn, K. C. Stein and R. B. Anderson completes the Bureau of Mines studies of cobalt catalysts and summarizes work on iron catalysts through 1953 in connection with studies of the Fischer-Tropsch synthesis. 139 pp. 8x104-in; paper. Bulletin 578, \$1, Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

### Russian Coal Industry

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D.

Some Aspects of the Coal Industry of the USSR, by George Markon and G. D. Drechsler reports on many phases of the Soviet coal industry, including brief descriptions of principal coal-bearing areas. I. C. 7876, Publications-Distribution Section, Bureau of Mines, 4800 Forbes Ave., Pittsburgh 13, Pa.

#### Testing Sealed Mines

Determining the Explosibility of Mine Atmospheres, by M. G. Zabetakis, R. W. Stahl and H. A. Watson describes the new technique developed by the Bureau of Mines for determining quickly whether an area that has been sealed to extinguish a mine fire can be reopened safely. I. C. 7901, Publications-Distribution Section, Bureau of Mines, 4800 Forbes Ave., Pittsburgh 13, Pa.

### Bituminous Output

YEAR TO DATE PRODUCTION July 18, 1959 ..... 219,765,000 July 19, 1958 ..... 207,061,000 1959 output 6.1% ahead of 1958.

A month earlier output was 6.4% ahead of 1958. WEEK ENDING PRODUCTION

July 18, 1959 ..... 7,120,000 July 19, 1958 ..... 7.535,000

Anthracite Output

YEAR TO DATE PRODUCTION July 18, 1959 ..... 10,264,000 July 19, 1958 ...... 11,090,000 1959 output 7.4% behind 1958. A month earlier output was 4.9% behind 1958.

WEEK ENDING July 18, 1959 ..... 354,000 July 19, 1958 ..... 458,000



# **Improved Gates Vulco Rope** gives you 2 important advantages

1. 40% higher hp rating at no increase in price: This important cost-saving advance is the result of Specialized Research in the world's largest belt-testing laboratories at Gates. As replacements on standard drives these V-belts with 40% more load-carrying ability give longer service life...reduce down-time, cut belt replacement costs.

2. Concave Sides (U. S. Pat. 1813698):

The sides of Gates Belts are concave (Fig. 1). When the belt is bent around the sheave, the concave sides fill out-become straight-for full, uniform contact with the sides of the sheave groove (Fig. 2). Uniform contact insures maximum pulling power...even distribution of wear...longer life.

Available in all sizes from your nearby Gates V-Belt Distributor listed in the Yellow Pages of your phone book.

When designing new drives

use Gates new Super HC V-Belts and Sheaves. See opposite page.

The Gates Rubber Co., Denver, Colorado Gates Rubber of Canada Ltd., Brantford, Ont.

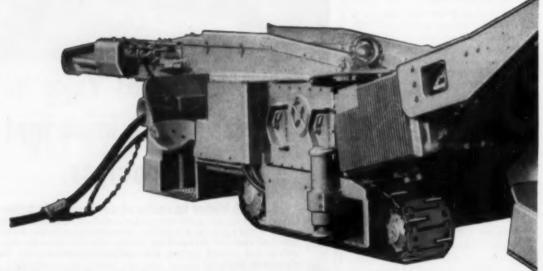
World's Largest Maker of V-Belts



Gates VULCO ROPE V-Belts

# POWER PACKED PROFIT Lee-Nouse CM37X and

The only miner that combines modern
loading with advanced cutting techniques



- Continuous mining reaches spectacular new heights in operational efficiency with each of these new and exclusively engineered heavy duty Lee-Norse Miners.
- Now powerpacked precision
  action teams with
  increased capacity
  and faster
  "overdrive"
  tramming speed
  to produce
  rapid-fire
  tonnage



# **PRODUCERS FOR 1959**

CM47X ... mining 42 inch

to 10 foot heights

that require no water cooling.



- A 24" flexible conveyor operates on hydraulically "no-clutch" gear motors applied to the gathering head.
- Controlled multiple tramming speed variable to 50 feet per minute, with "overdrive" at 90-100 feet per minute.



Lee-Nouse MINERS keep production on the go! Coal high or low? ...



### "I've seen our Ford Tandems pull out where others couldn't"

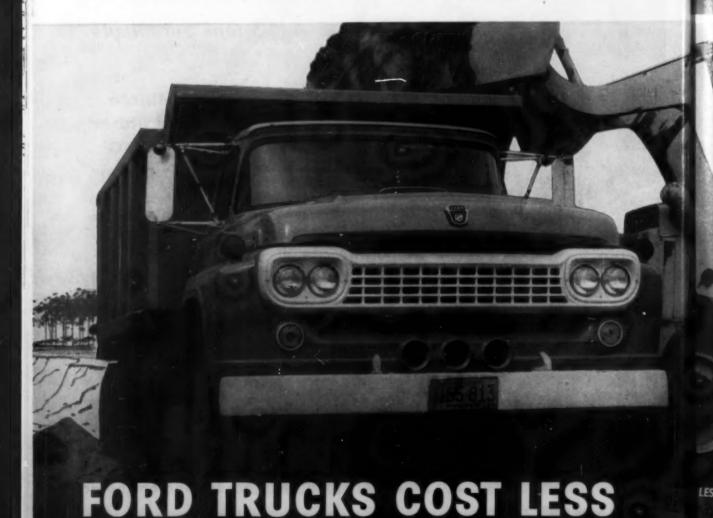
says Walter E. Carlson, President
Park Construction Company, Minneapolis, Minnesota

# "We're still using the first Ford Tandems we bought in 1954!

"In the construction business, our trucks really take a beating. They have to be rugged and durable, and that's why we like our Ford Tandems. On one of our earth moving jobs, for example, our Ford T-800's are in constant operation an average of ten hours each day, traveling about two hundred miles. They climb out of the pit, loaded with twelve yards of dirt, and walk right up a 12% grade. In fact, I've often seen our Fords pull out of places where other trucks couldn't.

"My father, who started the business back in 1910 with a horse and wagon, bought one of the first Ford Trucks ever made. That was over 44 years ago—and we've used Ford Trucks ever since. We pioneered the use of Ford Tandem Axle Trucks in this area in 1954. Now we have a total of forty trucks, including thirty-five Fords.

"We completely overhaul our trucks at the end of each construction season. That way we keep them in top operating condition and they last longer. We like Ford service, too, because we don't have to tie up our money in a large parts inventory. We can always get the parts we need quickly from our Ford Dealer."







# `59 FORD PICKUPS GIVE 25,2% MORE MPG!

25.2% advantage delivered in Economy Showdown Tests means five days' driving on four days' gas

The nation's leading automotive research organization\* proved and certifies that a '59 Ford Six Pickup will run five days on the same amount of gas the average competitive '59 pickup burns in four days.

The tests were made on 1959 six-cylinder ½-ton pickups of the six leading makes purchased from dealers — just as you would. The trucks were tested in every kind of driving—high and low speeds, open highway and city streets, even simulated door-to-door delivery. And in every test '59 Ford Sixes delivered more miles per gallon than any other make.

Here are the actual percentages:

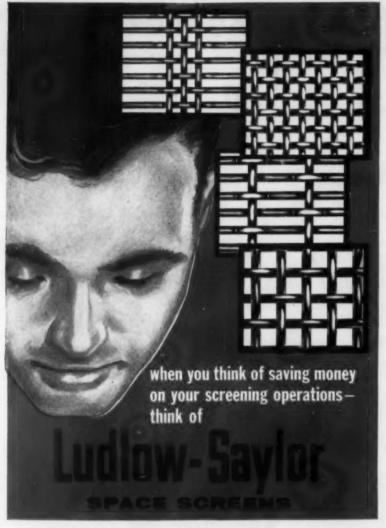
HOW NEW '59 SIXES RATE IN GAS MILEAGE						
'59 FORD SIXES GIVE	25.2% more miles per gallon than Make **C"			42.6% more miles per gellon than Make **D**		

What's the secret of Ford's economy? First, of all pickup sixes, only the Ford Six has modern Short Stroke design which reduces engine friction and thus requires less fuel. Second, to this modern engine, Ford has added a new economy carburetor to meter fuel more precisely in both high- and low-speed ranges.

Your Ford Dealer has the complete report of Economy Showdown U.S.A. See him and get the whole story firsthand.

Go FORD WARD for savings!

\*Name available on request. Send inquiry to P.O. Box 2687, Detroit 31, Michigan



Any Screen won't do-specify Ludiow-Saylort While sharply competitive in price, L-S Screens give you tougher resistance to abrasion, distortion, fatigue—last up to twice as long—promise these other important advantages:

- do a more accurate sizing job-insure uniformly higher quality products
- give more efficient separation on the first pass—cut plant-clogging re-circulating loads to minimum
- step up feed and increase output compared to the sluggish movement of materials across improperly woven screens
- automatically corrects variable crushing characteristics of raw materials
- cut screen replacements as much as half—reduce downtime and maintenance equally as much.

Your investment in sizing equipment can pay higher returns if you Order—Insist on—Ludlow-Saylor Screens!

L-S Screens and Cloth can be furnished in any nteel, stainless, aluminum, Mooel, copper, bressor any other metal that can be drawn into wire.

Write for Condensed Screen Catalog of most weaves



LUDLOW-SAYLOR WIRE CLOTH CO. 609 S. NEWSTEAD AVE

SALES OFFICES: BIRMINGHAM, 1727—Sth Ave. N. « CHICAGO, 6261 W. Grand Ave. « PITTSBURGH, Unit Trust Bidg. « HOUSTON, 5638 Harvey Wilson Drive » DE NVER, 1530 Carr St. » LOS ANGELE Star Wire Screen & Iron Works, Inc. (Ludlow-Saylor Subsidiary), 2515 San Fernando Road. use the fine coal would combine with the coal tar in the hot-mix plant in a matter of moments.

What Coals—So far indications are the most of the high-rank coals would be more suitable with authracite and subbituminous and l'gnite less or not at all suitable. If coal was processed specifically for the job, with char going to another outlet, a mile of average road would require around 2,200 tons.

### **New Standard**

A new standard for returnable reels has been approved by the Wire & Cable Section of the National Electrical Mfg. Association, according to D. E. Allen, Section Chairman, and vice-president—sales, Anaconda Wire & Cable Co.

The standard is designated as an NEMA "Suggested Standard for Future Design" because it applies to those reels used after present inventories have been depleted. It provides dimensions for the production of economical, technically sound reels to meet all the normal needs of the industry.

A survey among wire and cable manufacturers taken in 1957, showed that more than 300 sizes of reels were being supplied with many varying only slightly in size and design. The Cable Section's Packaging Committee followed this up with a survey among reel manufacturers, producers of wire and cable and power suppliers to obtain comments on what they considered to be major factors in determining reel dimensions. Factors mentioned it is reported, included: production equipment limitations in wire and cable factories, dimensional requirements in box cars and freight trucks and the need for maximum capacity on power supplier trucks.

With these factors as a guide the new standard was developed. Copies of the dimensions and information regarding the standard are obtainable from the NEMA Wire & Cable Section, 155 E. 44th St., New York 17.

### Receives Award

The Old Timers Club, Pittsburgh, Pa., recontly presented its annual award for the outstanding graduating senior in mining engineering at Virginia Polytechnic Lisitute, to Okley B. Bucklen.

Mr. Bucklen, hailing from Doran, Va., is now employed by the North American Coal Corp., Cleveland, Ohio. Ellis Paxton Bucklen, Okley's brother, made the award at the Annual Burkhart Mining Society Dinner.

(Continued on p 58)



### NOW-Dust-free drilling without water!

... with the Le Roi LLV Dust-collecting Air Leg Drill

You'll drill fast, dry, and clean through the hardest rock with the new Le Roi LLV Dust-collecting Air Leg Drill. It outperforms wet-drilling machines and has a much lower dust count — you don't use a drop of water in the mine or tunnel.

The LLV's efficient dust collection keeps holes clean for faster, deeper penetration — prevents stuck steels and lost holes. Its powerful suction removes cuttings through the hollow drill steel and out the side of the chuck housing. *None* passes through the machine. Results: less maintenance and longer tool life.

Ask your Le Roi distributor for a demonstration. Or write Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin.

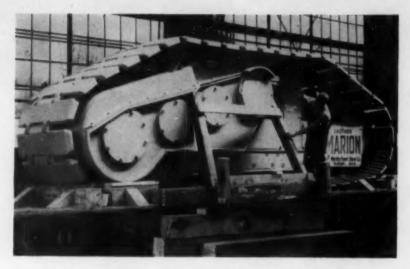


DRY "DUSTLESS" LLV collects cuttings in LX-1 dust box. Operator can empty box by remote control lever on drill.

LE ROI NEWMATIC® AIR TOOLS



Distributed in the Coal Fields by: Acme Machinery Company, Huntington, West Virginia, and Equipment Service Company, Inc., Birmingham, Alabama.



### Giant New Machine

Latest contribution to the coal stripping industry is a 65-cu-yd machine with a 170-ft boom, now in production at Marion Power Shovel Co.'s plant in Marion, Ohio. The machine, the shovel boom of which, is said to be the largest ever made, has been purchased by Peabody Coal Co. for use at its Lynnville mine near Evansville, Ind. Crawlers and lower frame have already been delivered to the erection site and field erec-

ONE OF EIGHT crawler assemblies for Marion Power Shovel Co.'s newest giant stripper, towers over workman preparing it for shipment to erection site.

tion of the huge machine will continue through August as various parts are finished in Marion's shops.

Scheduled to be in full operation before the year's end, the new Type 5761 is similar to the five Marion Type 5760's designed and built over the past several years. Major differences include: boom length-170 ft on the 5761 against 150 ft on the 5760; working weight-6,558,000 lb compared to 5,780,000 lb; and six 187 hp swing motors instead of four of the same rating for the 5760.

### Coal and Atom

The Bureau of Mines has been asked by Senators Cooper and Morton (Reps., Ky.), to set up an experimental station in the Kentucky coal fields to conduct research, development and scientific exploration of the "advantageous relationship between coal and nuclear energy..."

The Senators said they would authorize appropriation of \$2.5 million to set up the experimental station and \$1 million annually for expenses and operation. The Atomic Energy Commission would be directed to provide assistance in setting up facilities of the station.

Intended for the common good and welfare, the project, it is believed, will lead to technology, products, processes and other desirable outgrowths.

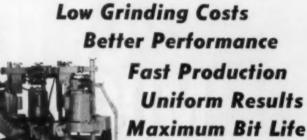
### Import Danger

JOSEPH E. MOODY, executive director of the Nation Coal Policy Conference, declared at a press conference that the New England economy is endangered to the extent that it bases it fuel needs solely upon the unrestricted flow of low-grade imported residual oil.

Mr. Moody pointed out that during World War II emergencies oil imports to New England dropped 65% and coal filled the gap. In peacetime, he said, there is a growing shift away from domestic production of residual oil as an unprofitable petroleum product, leaving oil users dependent solely upon imports of foreign surpluses.

### Merit Award

A certificate of merit for outstanding newspaper advertising has been awarded to the Illinois Coal Strippers Association by the national Newspaper Ad-





WRITE TODAY for fully descriptive bulletin! These are a few of the many advantages you get when you grind your bits automatically on the FAIRVIEW BIT GRINDER.

All of these advantages boil down to savings of both labor and wheels, productivity of 250 to 350 per hour, correct angles—smooth finish, more regrinds, more grinds per bit, more tons per grind and elimination of hazardous operation. It's to your advantage to use the FAIR-VIEW BIT GRINDER both in the satisfactory grinding results obtained and in the protection of your investment in expensive equipment.

### FAIRVIEW BIT COMPANY

FAIRVIEW, WEST VIRGINIA

**CURTISS-WRIGHT MODEL** 

2226

CW-226 SELF-PROPELLED SCRAPER Capacities: 26 cu. yds. struck, 36 cu. yds. heaped, 78,000 pound rated load

> SALES · SERVICE · PARTS at your CURTISS-WRIGHT DISTRIBUTOR

Throughout the cycle—from the easy loading, through the high speed travel, to the fast dump, you're YARDS AHEAD with Curtiss-Wright scrapers. Designed and built to meet the skyrocketing production demands of today's construction industry, the CW-226 gives users a daily output unmatched by any competitive machine. See how the CW-226 can give your job a production boost—Let your C-W distributor give you complete details on the "Yards Ahead" features of the Curtiss-Wright line.

SOUTH REND DIVISION

**CURTISS-WRIGHT** 

CORPORATION SOUTH BEND, INDIANA

## The New H&P Fluid Bed Dryer...

### Proven

Minimum Maintenance Low Cost Operation Uniform Evaporation Automatic Control Lowest Degradation Wide Range of Sizes

Decidedly The Outstanding Fine Coal Dryer For YOUR

Preparation Plant



PACKSACK WORKS ON COMPRESSED AIR!

air, the Acker Packsock answers every need for a lightweight core drill for the mining industry.

The Packsock sets up quickly and is easy to operate - even where space is at a minimum. Use it for test holes, blast holes, plotting veins, wall sampling and exploration drilling.

For surface mining, the Pocksack is available with a thrifty 5.5 H. P. gasoline powered drill.

Write today for Bulletin 22.-CA





MOTOR DRIVEN

Lightweight air motor driven ocity 10 g.p.m. Makes a compact portable pumping



acker Diamond Bits are scientifically lesigned and set for economical, languagesting operation.

P.O. BOX 830 INC. SCRANTON 2, PA.

### News Roundup (Continued)

vertising Executives Association, Inc.

The award cites the special coal section of the Canton, Ill., Da'ly Ledger and Galesburg Register Mail, sponsored by the Strippers and prepared by the Association's secretary-treasurer, A. J. Christiansen: its reclamation engineer, L. S. Weber; and John Dewey of the Ledger. The 20-p tabloid section described progress in land reclamation in Illinois strip mine areas.

### Utilization

Informed sources say the proposed steam plant in the Cle Elum, Wash., area will not be producing power until

Estimates indicate there are enough hydroelectric power projects under construction to avoid a power shortage until around 1965.

Pacific Power & Light Co. is studying coal resources in Washington and Oregon for future steam-electric generating plants in those two states.

The firm, which operates in five western states, undertook extensive geologcal surveys in Wyoming in advance of construction of its 100,000-kw Dave Johnston steam-electric generating plant near Glenrock.

A detailed engineering study on the cost and feasibility of using Pennsylvania anthracite to produce pipeline gas and hydrogen, made by the M. W. Kellogg Co., New York, for the Bureau of Mines, is available as an open-file report, it was announced by the Dept. of Interior.

The report is in two volumes. One describes in detail the design, operation and estimated cost of plants for producing 90 million cu ft of p'peline gas daily and 35 million cu ft of hydrogen daily from anthracite. The second volume of the report summarizes the detailed data obtained by the Kellogg Co.

A Long Island, N. Y., man built a 33-ft coal-burning cabin cruiser and launched it successfully recently.

The boat, fashioned by John A. Nernoff Sr., a licensed steam engineer, is made of mahogany, teak and white cedar and will sleep four. An upright tubular boiler capable of generating 450 lb of steam pressure and a 1913 marine engine are capable of driving the craft at about 6 knots. Bunkers for soft coal and three 35-gal water tanks beneath the deck store the necessary fuel. The vessel will use about 5 lb of coal for each mile. Materials for the boat cost about \$5,000. A comparable craft built in a shipyard might have cost as much as \$30,000, said Mr. Nernoff's son.



with cross perforated steel screens . . .

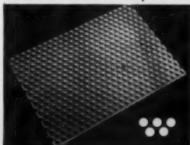
# You can save up to 20% on replacement

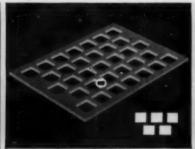
For many coal screening applications, CROSS Perforated Screens made from high-quality steel can save you as much as 20% on replacement costs. Tests prove that CROSS Perforated Screens have a service life nearly double that of other types of coal screens. And, because CROSS screen plates are manufactured as rigid, one-piece units, there is no problem of stretching or loss of screen tension. You save on down-time costs, too, because screen ad-

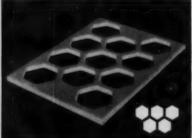
justments and reshaping are eliminated.

CROSS PERFORATED steel screens are available in a wide range of sizes with uniformly spaced square, hexagon or round perforations, staggered for increased capacity and efficiency. For additional information on CROSS Perforated Screens for shakers, vibrators and revolving screens, write CROSS PERFORATED METALS, National-Standard Company, Carbondale, Pa.

CROSS makes a complete line of perforated screens to fit every need







**CROSS** Perforated Metals

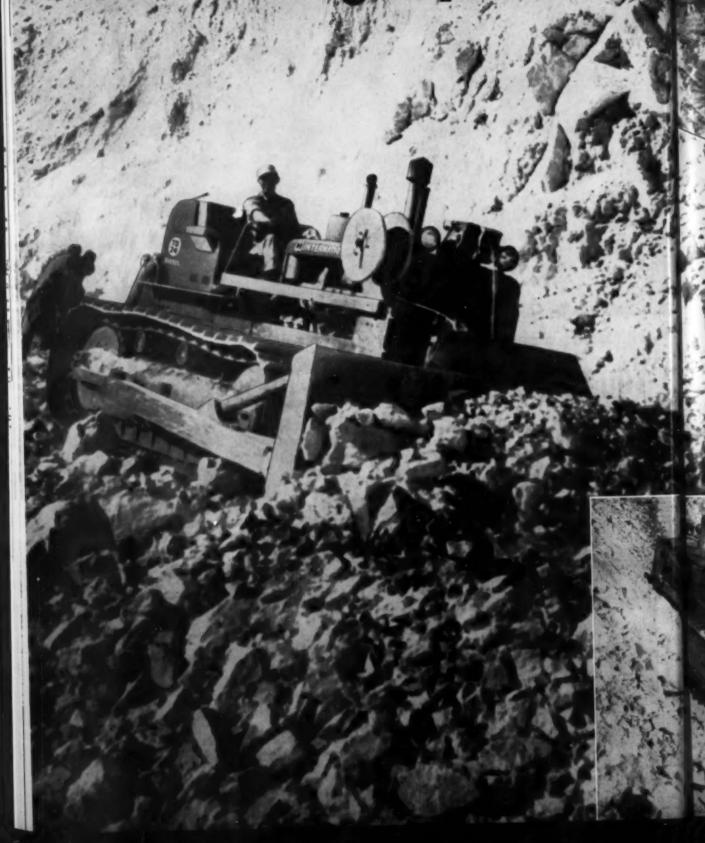
Carbondale, Pa.

NATIONAL



STANDARD

Our blasting days are ove



# with the TD-24" -Wrightwood White Rock Co., Wrightwood, California

"With the International TD-24 our need for explosives to shatter rock is eliminated," declares Owner Dale Douce, Wrightwood White Rock Co.

"The '24' can do a better job than dynamite at a fraction of the cost."

The TD-24 removes a 40-foot overburden from the 1,000-foot-thick deposit—rips the rock into fragments, dozes it down to the loading level.

It's typical of the tough rock jobs which so many miners and quarrymen are doing to best advantage with Planet Power-steered TD-24's—against any other method or machine!

How TD-24's double for dynamite

Sometimes it even takes two kingsized, clutch-steered crawlers to equal years-proved Planet Power steering gives your operator full-time "live" power on both TD-24 tracks—full-time separate and positive control of each track! And full-time, on-the-go Hi-Lo (up or down!) power-shifting.

Load-limiting and load-spilling "dead-track drag" is eliminated, be-

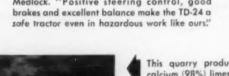
one Planet Power-steered TD-24 on

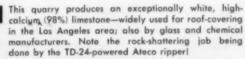
rough, tough rock-moving. Exclusive,

Load-limiting and load-spilling "dead-track drag" is eliminated, because Planet Power steering keeps the full payload on the move even on turns. Gives bonus-load follow-through when ripping or dozing rock. Equalizes track speed for full-bite benching!

Prove the amazing production increase Planet Power-steered TD-24's can give and keep giving you—"blasting" through rock or other tough materials—or on everyday overburden removal. Compare TD-24 undercarriage strength—long, heavy-duty trackroller life and maintenance ease—precision sealing of parts—to anything else on tracks! See your International Construction Equipment Distributor for a demonstration!

"I always feel confident in the big TD-24, even working on the edge of benches with a sheer 100-foot drop," reports Operator Lloyd Medlock. "Positive steering control, good brakes and excellent balance make the TD-24 a safe tractor even in hazardous work like ours."









International Harvester Co., 180 North Michigan Avenue A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors...Self-Propelled Scrapers and Bottom-Dump Wagons...Crawler and Rubber-Tired Loaders...Off-Highway Haulers...Diesel and Carbureted Engines...Mater Trucks...Farm Tractors and Equipment.

Measure new 34 cu yd International Payscraper advantages

# **NEW** power-to-payload

hauling, jam-proof ejection. I



You can heap up to 34 cu. yd. on a 2-axle International 295 Payscraper (or a 3-axle "495" model). You can operate as fast as 32 mph.—faster, even than smaller rigs of other makes.

You've got industry-topping, power-to-payload wallop in these giant new models. You get the sock of 375 high-torque turbocharged diesel "horses" from International's fuel-thrifty new DT-817 six-cylinder diesel. You get direct, push-button starting; all-altitude high-efficiency performance.

### Exclusive bowl "with a flare" loads and keeps bigger heaps!

Exclusive new Payscraper tapered bowl design outcycles "slow loaders," "load spillers," and "reluctant dumpers." Widest of all cutting widths—131 inches—lets scraper wheels and pusher operate inside the cut, the best traction zone. Wide-cutting bowl and center rolling boil-in speeds heap loading. The tapered bowl is a superior heapholder even at the faster haul speeds. Obstruction-free bowl provides fast, positive jam-proof ejection.

### Operators become full-time earthmovers!

Minute-stealing operating delays are eliminated, with speed-gaining, balanced design. The 295 Payscraper operator, for example, commands ample power and traction to pull out of 90° turns—even on soft filswithout time-losing back-ups.

The operator rides in cushioned comfort in a 16-ad justment seat that smothers bumps. He has reach-ear power brakes, "control tower" vision, flush deck safety For the first time in big 2-axle scraper history, the operator becomes a confident, full-time, full-capacity dir mover!

From power to push-block—from fuel thrift to dirt of the fill—compare new giant-sized International Pay scraper models to anything else on wheels. Note how they lead in turbocharged diesel horsepower. Match exclusive tapered-bowl scraper advantages against less advanced design. Size up strength—ease of control-speed—capacity! See your International Construction Equipment Distributor!



International Construction Equipment

International Harvester Co., 180 North Michigan Avenue

A COMPLETE POWER PACKAGE: Crowler and Wheel Tractors...Self-Propelled Scrapers and Bottom-Dump Wegans...Crawler and Rubber-Tired Loaders...Off-Highway Houlers...Diseel and Carbureted Engines...Motor Trucks...Farm Tractor

# n. NEW full-power 90° turning





16-ad

h-ear

safety

ope

Three "295's" of a 6-unit Payscraper fleet, building new superhighway near Beloit, Wisconsin. Both the "295" and "495" fealure International's fast-acting, finger-tip controlled model 280 cable control unit—built to give you high capacity; simple adjustments; low upkeep! Positive, forced ejection, plus gaping 98" apron opening, assures fast, positive dumping of all materials. Even gummy, barrel-sized blue clay chunks are quickly ejected—as this "495" view proves, on an operation of V. H & M Construction Co., Denham Springs, Louisiana.





### A thunderstorm three miles away has been known to detonate a blast prematurely



### For best protection against stray electric currents

You need not worry about stray electrical currents when you can hook-up and detonate with Primacord! It acts as the detonating agent throughout the entire column of explosives, or furnishes initiation to primers. This use of Primacord will result in safer, easier, quicker loading. Primacord also connects all holes, providing positive initiation, with results that you should find profitable.

When your blast is loaded and hooked up, it cannot be set off by normal vibration or friction, ordinary impact or sparks, or stray electrical currents. Even a direct hit by lightning failed to detonate Primacord. It must be detonated with fuse and cap or electrical blasting cap. This will be the only cap on the job, put on only when you are ready to blast.

# **ENSIGN-BICKFORD** PRIMACORD **DETONATING FUSE**



The trunk line illustrated is Lo-Temp® Primacord. For further information see your explosives supplier or write to

## THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut . Since 1836

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry



AUGUST, 1959

IVAN A. GIVEN, EDITOR

### **Basic for Business**

ONE OF COAL'S long-standing handicaps in going after certain classes of business has been the fact that it has had to depend on others for the vital ingredient in the transaction-the equipment to make the use of coal possible. Coal is of course not the only industry in this situation but if it had had a more-direct relationship with the sale, installation and servicing of burning equipment there is little doubt but that it would not have experienced as heavy losses in the domestic, commercial and general industrial fields and might, even, have retained a fair share of the railroad business.

One of the drawbacks to lack of direct participation in sale, installation and servicing of burning equipment is the very-real difficulty encountered in translating the results of research and development into installations that bring business. That difficulty has been especially noticeable in coal. It is recognized that it should be eliminated.

One method of elimination is winning the active cooperation of independent manufacturers, sellers and installers. This is anything but easy, even today, though progress is being made. The second is to set up industry-owned sales. installation and service organizations, such as the example featured in the article starting on the following page of this issue. It does not follow that scaling up and expanding this idea would be easy either, but coal now has developed equipment that can meet and beat competition, particularly in the general commercial and industrial field-if properly sold and serviced. In the present reorganization for more-effective merchandising the basic idea deserves a place well up in front.

### **Continued Opportunity**

REACH, RANGE AND CAPACITY are the big goals in coal's expenditures for production equipment—all three in stripping and the latter primarily in deep mining. For the moment the stripping might be said to be occupying the front of the stage with, among other things, the wheel excavator (see cover) and a new 65-yd shovel (under construction). Both feature unusual reach, range and capacity—for the wheel, 3,500 cu yd per hr, a dirt haul of 420 ft plus from digging to dumping point, and a stacking height of 119¼ ft; for the shovel, with 170-ft boom and a weight of 6,558,000

lb, a dumping height of 116 ft and a dumping radius of 162 ft.

Net result of these and other developments is further solidification of stripping's position and a postponement of the day when deep mining can compete in cost, even though it, too, has been characterized by equally significant advances in machine capacity and productivity. But even though deep mining must wait a while longer to overtake stripping, the fact that there still is room for major improvement on both sides is the best guarantee of all that coal can continue to grow.

## Opportunity for Coal: Regional

IN THE FOLLOWING ARTICLE, Martin Burke Jr., president, North Western-Hanna Fuel Co., Minneapolis, Minn., proposes a national program to encourage and guide formation of regionally financed and operated coal-equipment sales and service agencies.

The proposal, made at BCR's Techno-Sales Conference in April, is based on the favorable experience of the Coal Burning Equipment Co., which Mr. Burke also heads as president. For the past 2 yr, CBE has been pioneering in the regional equipment-selling approach in the highly competitive area of Upper Michigan, Wisconsin, Minnesota, North and South Dakota, and part of Iowa. Says Mr. Burke:

"The most important accomplishment is the fact that the company has demonstrated that a program of this kind can be beneficial to the coal industry. Equally important, it appears that it will soon be financially self-supporting."

Among industry leaders who have openly endorsed Mr. Burke's proposal are the following:

At BCR's Techno-Sales Conference, April 22, W. W. Bayfield, president, American Coal Sales Association: "I suggest this plan can serve as a basic model for the rest of the industry . . ."

At ACSA's annual convention June 26, J. E. Moody, president of the National Coal Policy Conference and the Southern Coal Producers Association: "I think the idea is sound, practical, and should be worked out as quickly as possible. The conference will help all it can."

Needed to carry out the plan is an industry-wide authority which would:

- Encourage the formation of, and set the pattern of organization for, regional equipment-selling agencies.
- Coordinate the activities and objectives of regional equipment-selling agencies with established

programs of industry research, engineering aid and market promotion.

Maintain close liaison with manufacturers of coal-burning equipment, and lend financial, consulting and sales assistance where necessary.

Each regional equipment-selling agency would offer a complete equipment-merchandising package—sales and sales promotion; installation, maintenance and repair service; and engineering aid. Each also would be set up as a coal-industry owned, profit-making organization. Initial capital would be raised from coal companies shipping into the marketing territory, and each participating company would subscribe stock on a pro-rated tonnage basis and share similarly in profits.

To insure good coverage in a sales territory, regional management should develop local sales and service outlets.

To ensure the full cooperation of all coal salesmen in the marketing area, each regional agency would agree to pay commissions for leads and sales efforts which result in equipment sales.

The immediate opportunity for regional equipment companies is in developing the commercial and industrial market, both off-track and on. Here, annual sales of coal are currently estimated at 120 million tons; of gas and oil, 120 and 60 million tons, respectively, of coal-equivalent. Thus, if regional equipment agencies, working with other industry groups, could capture from 25 to 50% of competitive fuel tonnage, it would mean another 45 to 90 million tons of business for coal.

Coal Age offers this recommendation on the proposal coming out of Mr. Burke's case-history report on the Coal Burning Equipment Co.: Consider it seriously as a jumping-off point for implementing the current drive to improve coal's merchandising structure (see panel p 70).

Martin Burke Jr.
President
North Western-Hanna Fuel Co., and
Coal Burning Equipment Co.
Minneapolis, Minn.

### Why CBE Was Formed; The Competitive Background

WE BELIEVE one of the toughest possible competitive situations exists in our marketing area, which covers Wisconsin, Minnesota, Upper Michigan, North and South Dakota and part of Iowa. In the background of the situation are these factors:

Our market area includes Eastern all-rail coal, Midwestern all-rail coal, lignite via rail, Eastern and Midwestern

coals received via barge and Eastern and Midwestern coals received via lake, stored on the various docks and then transshipped by car or truck.

We compete with fuel oil received via lake vessels, river barges, railroad cars, pipelines, and truck lines.

3. We also compete with natural gas, a large quantity of which is sold at dump prices in our area. Industrial interruptible gas prices in our area are as low as 26.5c per MCF for the larger industrial plants and not over 24c for some utility usage. The price for natural gas for commercial and small steam plants is under 40c per MCF.

We are in a high-freight area when you analyze freight rates on coal; therefore, gas prices are somewhat correlated to coal freight rates. A striking example of the impact of natural-gas competition is the Minneapolis-St. Paul area where there remains only 10-15,000 tons of domestic coal business.

Inroads of natural gas and fuel oil have made it difficult to have coal-burning equipment sales and service companies continue in business. Coal dealers in a large segment of the sales area were becoming more discouraged in their efforts to sell coal due to their inability to supply coal-burning equipment service.

With this background, the coaldock industry decided that a unified effort must be made to enable the coal dealers to have a source of coal-

## Selling of Coal-Burning Equipment

burning equipment available for their customers. Fortunately, there was one company endeavoring to provide this service—the Carnegie Dock & Fuel Co., a subsidiary of Island Creek. The company was not making a profit but was rendering an invaluable service to the coal industry. Officials of the company were agreeable to working with the other coal-dock companies in the formation of a coal-burning equipment company that could serve the area. They agreed to sell their coal-burning equipment company as a nucleus for the new company.

After many meetings the following plan of action was arrived at:

### How CBE Was Organized

The Coal Burning Equipment Co. was organized July 1, 1957, by all the Lake Superior dock companies to take over and expand activities of the Heating Div. of Carnegie Dock & Fuel Co.

Stock in the new company was purchased by all of the Lake Superior dock companies, most of which are affiliates of eastern producing companies), four Midwestern producing companies, one Eastern producing company and two Eastern railroad companies. Stock in the amount of \$84,000 was sold, which was sufficient to purchase the Carnegie Dock & Fuel Co. inventory and establish modest working capital.

It was the aim of the new company to sell coal-burning equipment in the area served by the Upper Lake Docks: Upper Michigan, Wisconsin, Minnesota, North and South Dakota and a part of Iowa.

The objectives of this company were:

- 1. To upgrade coal burning equipment to increase the efficiency of the consumer's plant, to reduce his labor costs and enhance his satisfaction with the use of coal.
- To gain new accounts for coal by the sale of coal-burning equipment to consumers now using a competitive fuel.
- To gain new accounts for coal by aggressive, promotional activity for the sale of coal-burning equipment to new installations.

Since capital was limited, it was

decided that this company must be established as a profit-making organization to obtain the necessary funds to increase its activities. The directors felt that the active cooperation of all coal-sales personnel was imperative to the success of an equipment-merchandising program. They also believed that to achieve the highest degree of such cooperation it should be made profitable to the people involved. Accordingly, a system was set up by which commissions are paid to coal salesmen for leads and successful sales efforts.

This policy has paid dividends. Coal salesmen have been stimulated to help the Coal Burning Equipment Co. because they are making extra money for themselves. Several of them have developed into very good equipment salesmen.

Another policy is to work closely with all other organizations devoted to improving coal markets. Toward that end a great deal of work is done with the representatives of Bituminous Coal Institute in this territory and with the coal-dealer organizations, which have been most cooperative and helpful.

Coal Burning Equipment Co. also serves as an outlet for Automatic Solid Fuels Equipment, Inc. While Automatic Solid Fuels publicity has created an interest in its recommended products, lack of personnel has not enabled it to effectively reach and service these northern markets. Present personnel of the Coal Burning Equipment Co. is one general manager, one sales manager, one service and parts manager, two, fulltime service men, one fulltime office girl and one parttime office girl.

#### How CBE Operates

As mentioned previously leads for sales and service are obtained primarily from coal salesmen and coal dealers. These leads are followed up by the manager or sales manager and they call in Bituminous Coal Institute men or coal company engineers for additional assistance when needed.

Other leads are obtained from the following:

1. Dodge reports.

- 2. Builders Exchange.
- 3. Architects and engineers.
- 4. Direct-mail advertising.
- 5. Trade-journal advertising.
- 6. Repeat calls from customers.
- 7. Bituminous Coal Institute.

Coal-burning-equipment dealers.
 The Coal Burning Equipment Co.
 has some 900 dealers on its mailing list and these include hardware stores, plumbing companies and coal dealers.

Installations and Service—Where competent installation men are not available, CBE will use its own men. Normally, installation men are available in or near the towns where jobs are sold. In that case the installation is still supervised by someone from CBE.

Repairs are usually made by CBE men either on the job or in the company shop. This shop is set up to do anything from repairing transmissions to completely rebuilding any stoker.

With these shop facilities, CBE buys used stokers, rebuilds them and either resells them where a customer cannot afford new equipment or will install them on a temporary basis until they can be replaced by new equipment.

In the spring, CBE starts its campaign for summer stoker service by contacting stoker owners with the attached mailing.

Equipment handled and sold includes Winkler and Combustioneer stokers; products of Automatic Solid Fuels Equipment; Coal-O-Matic, Stokermatic, Warm Morning Stoves, warm air steel furnaces, conveyors, controls, and repair parts.

### Saving and Gaining Customers

One example of how coal customers can be saved through the intelligent sale of new equipment is the Northern Cold Storage Plant at Duluth, Minn. This company was about to change from hand-fired coal equipment to oil because the oil burner would effect a saving of approximately \$7,000 per year in labor costs for firing on Saturdays, Sundays and at night.

A progressive coal salesman explained that the plant could accomplish the same result by the installation of a stoker connected to an

### For a More Vigorous Attack on Coal's Markets . . .

TOP ITEM on coal's agenda in the past 6 mo has been a drive to develop a harder-hitting merchandising program.

Among results so far, especially notable have been the formation of the National Coal Policy Conference to push development of a national fuels policy, and the reorganization of the National Coal Association to permit mergers with other industry associations and coal groups.

In another facet of the drive BCI is now promoting "leasing as a method of selling coal-burning equipment." In certain situations, this method can overcome the old problem of lower costs for oil and gas equipment.

Significant, too, has been a growing unanimity of sentiment for expanded, more-aggressive marketing effort. During the past 6 mo, typical comment from industry leaders has included the following:

F. Stillman Elfred, chairman of the board, National Coal Association: "Through the consolidation of various coal industry organizations we will intensify our efforts to find new markets for coal and eliminate legislative and adminisstrative obstacles to the expanded use of this great resource."

Carroll F. Hardy, managing director, Bituminous Coal Institute: "BCI has produced concrete results to justify its existence. It has set up a pattern of successful coal promotion. Here is an organization that works—the only need is for more of the same—more industry support in money and manpower, more cooperative action from coal men on every level, more individual efforts to win projects for coal, more interest in the future of coal as well as immediate tonnage."

W. W. Bayfield, president, American Coal Sales Association: "We must make it easy, very easy, for people to buy, install, and have serviced, coal-burning equipment. If we don't all our promotional efforts and all our public relations activities, just like all our research, become a meaningless waste of money."

Dr. R. L. Savage, vice president, North American Coal Corp. and director, Bituminous Coal Research: "In the selection of projects an industry research association should require that participating firms be able to exploit the anticipated results. Several successful projects undertaken by coal industry research may never attain full commercial realization because there is no effective mechanism in the coal industry to commercialize results."

Ivan Given, chief editor, Coal Age: "The job of the moment is to create a market-development approach and organization for coal as powerful as the production setup. As with production, two of the big ingredients are money and talent. The organizations for making such money and talent effective already exist or can be created. Achieving that effectiveness represents an opportunity for coal every bit as big as the opportunity in production."

The impact of coal's drive for more aggressive marketing effort is already striking home in competitive quarters. Following his appearance as spokesman for natural gas at NCA's June convention, W. M. Elmer, president, Texas Gas Transmission Corp., addressed the Kentucky Oil and Gas Association. He warned his colleagues: "against a very-effective program being waged by the National Coal Association and the United Mine Workers to prevent sale of oil and gas for industrial use." Protection against this program is a major need, Mr. Elmer added.

Make no mistake, however, the selling job for coal has only begun—it's big, tough and allows no room for complacency. Now that coal is on the move, let's keep it moving with bolder, more-imaginative, more-comprehensive, more-intensified effort than the industry has ever known before—The editors.

"electric brain." Under this program the stoker would be set up for the necessary pressure during working days and get back to stand-by pressure on Saturdays, Sundays and at night. Automatic controls would regulate the underfire air, the overfire air and the amount of coal being fed to the furnace. All of these controls would be set up to a Western Union signal board which would flash a warning in the event the boiler water got too low, boiler pressure was out of line or a shear pin failed.

This company bought a new 500lb-per-hr Combustioneer stoker with the recommended controls. The savings which will result from stokerfiring, adequate controls and reduced janitor service will enable them to pay for this equipment in 1 yr.

Another interesting example of

what can be accomplished is the case of Chun King Foods in Duluth. Although this company was using coal in two boilers, they were firing a 300-hp Scotch marine boiler with oil. A coal salesman interested them in the use of coal in this unit and asked CBE for help. A survey of the plant was made and they were sold a Kol-Master stoker which increased the boiler capacity by 25%. This conversion from oil represents 1,000 tons of coal per year.

Bituminous Coal Institute has been aggressively successful in our area. For the past few years we have been able to follow up school-board meetings with equipment quotations on the following basis: BCI and industry representatives present the case for coal to a school board; this is followed by CBE when new firing

equipment is needed or present equipment is in need of service.

On BCI cases the Coal Burning Equipment Co. has installed stokers in a 750-ton account for the school at Ivanhoe, Minn., a 600-ton account for the school at Benson, Minn., and a 600-ton account for the school at Chisholm, Minn., just to cite a few.

Dealer Association Aid—The Northwestern Retail Coal Dealers' Association also provides leads for sales and service as indicated by excerpts from its monthly magazine. Under "Home Owner Accounts" the magazine says:

This is an important new service available through your association. Here is how it works.

One Minnesota dealer wrote to the association giving the name of a home owner who was about to change from coal to oil because of a fly-ash problem. The association asked his wholesale supplier to survey the problem. When facts were obtained CBE recommended minor repairs which eliminated the trouble and resulted in a satisfied coal user.

Another fly-ash complaint came from Wisconsin. A survey found that cementing air leaks and changing blower adjustments corrected the trouble and satisfied the coal user.

Another case came from a Minnesota dealer about to lose two coal accounts. A survey showed that one unit could be put into satisfactory operating condition with minor repairs. The other was more serious. It required the sale and installation of a new stoker. This man's letter to the association saved two coal accounts and gave the dealer two satisfied, enthusiastic customers.

A South Dakota retailer reported that local plumbing and heating men would not repair a stoker and furnace. They said that the furnace and stoker were complete wrecks and insisted on selling new oil-burning equipment. A survey was made and the trouble was corrected by replacing a stoker worm and a highlimit control. The retail coal dealer is helpless when furnace men either do not know how to handle coal equipment, or when they are interested only in the sale of new oil-burning or gas-burning equipment.

Under "Industrial and Commercial Accounts," the magazine says:

BCI has a splendid record of success in gaining and saving school accounts. It is only necessary to request this service early enough. Early means before the architect is hired if possible, and certainly before the architect has drawn the plans and received an O.K.

When a coal account is in jeopardy the retail coal dealer should do two things. First, ask the school board or the buyer for a meeting where BCI can present the case for coal. Second, write to the BCI office giving the date the school board will meet with a BCI representative. BCI will have someone attend this meeting.

BCI cannot act successfully unless local retail coal dealers make early dates in the beginning when the coal account is in jeopardy. No one can set up a date with the school board or buyer as easily as local people. In return for securing BCI dates, the retailer gains and holds profitable ac-



BROCHURE DISPLAY (above) is one way CBE takes the story of modern coalburning equipment and engineering service to dealers and consumers.

counts. The coal dealers in our territory know it is good insurance to write to their association office whenever they can use the services of BCI or CBE.

#### Outlook Promising

It was expected that Coal Burning Equipment Co. would lose money for the first 2 yr of operation and this has proved to be the case, although losses have been considerably less during the second year.

From May 1, 1958, through Feb. 28, 1959, sales were \$145,269.98; gross profit was \$34,597.57 and net loss was \$9,628.88. This compares with a net loss of \$14,243.82 during a comparable period last year. Some changes in personnel were made last fall and since that time montly losses have been slowly diminishing.

The most important accomplishment is the fact that this company has demonstrated that a program of this kind can be beneficial to the coal industry and, equally important, it appears that it will soon be financially self-supporting. Sales volume this year should be substantially ahead of last year.

Growth possibilities are also in the picture. CBE will be expanded as the need for same arises. Management, however, has been instructed to develop installation, sales and service outlets in various locations of the sales territory to insure good coverage rather than to expand from a central location.

#### How the Industry Can Help

There are a number of things the industry can do to make CBE's program more effective. The industry should:

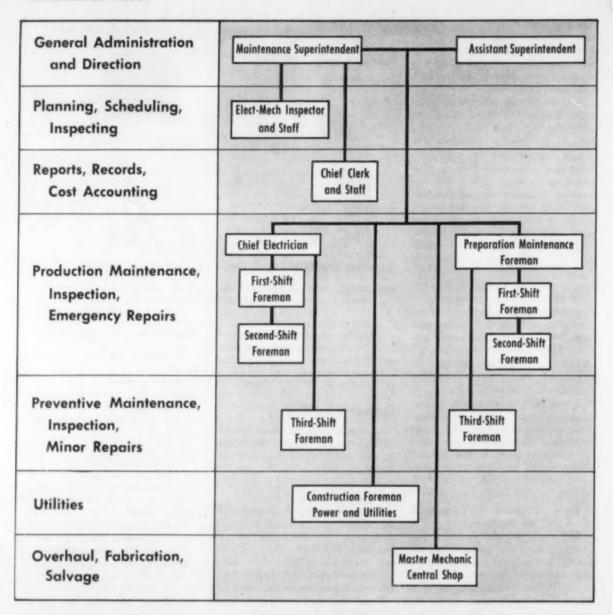
1. Assume the responsibility of providing adequate coal-burning equipment.

2. Be willing to assist in financing, if necessary, coal-burning equipment-manufacturing companies, as well as the sales organizations that must be formed to sell and service coal-burning equipment.

3. Develop a program covering the manufacture and sale of coal-burning equipment. The program should be guided by an industry marketing agency with direct supervision at a district level.

Most will agree that the type program we have can readily be projected to other geographical areas of the coal industry provided that our industry establishes a national program to encourage same. The industry needs one agency to represent a unified program on legislation, research and marketing with separate departments covering each major segment.

We are hopeful that the experience of Coal Burning Equipment Co.—a cooperative effort of the coal-dock industry, some Midwestern and Eastern producing companies, and a few of the railroads—is a step in the right direction to further this type program nationwide in all coal-burning segments of our country.



### Organizing for Better Maintenance

- Organization: Development, Responsibility, Authority
- Personnel: Selection, Training
- Procedure: Policy, Practice

By Daniel Jackson Jr., Assistant Editor, Coal Age

MAINTENANCE ORGANIZA-TIONS, old and new, will undergo numerous changes in the years ahead. Why? The answer is twofold:

 Machines continue to take over more of the production load and more production capacity is being concentrated in individual machines.

The cost, capacity and complexity of modern equipment increases the burden on maintenance departments.

Future equipment designs—Those still in the drawing-board stage—provide for controlling the new machines by methods which to date are unfamiliar to the mining industry. Add these reasons to the rising cost of labor and materials for both operation and maintenance, and a well-organized maintenance department with qualified supervisors, engineers and technicians becomes a must.

Future maintenance organizations will require "maintenance engineering" to cope with added responsibilities and new techniques. Automamation and electronics will assume major importance in the mining industry in the not-too-distant future. These new fields of technology give insight into the future of maintenance and highlight the need for more engineering ability. Electricity, hydraulies and mechanics will require more engineering know-how tomorrow. Consequently, maintenance departments must organize and staff accordingly. Otherwise, production goals will never be reached nor will it be possible to control operating cost.

The importance of maintenance must not only be realized. Followthrough is vital and the first step is to determine what the organization should be and what it should do.

Although the answers to these

New Maintenance Service . . .

### "Maintenance Ideas"

BEGINNING with the accompanying special report *Coal Age* will offer each month a new section bearing the running line "Maintenance Ideas."

The inauguration of this section reflects the growing importance of maintenance in coal mining and in turn the growing service being rendered by *Coal Age* in all phases of this activity. The new section will permit a significant increase in the scope and volume of material for both maintenance men and operating men concerned with maintenance.

Coverage—The entire maintenance field from overall organization down to the fine details, such as, servicing relays, in deep mining, strip mining and preparation. Planned for September, for example, are the following:

"Cable Splicing"-full-length feature direct from the field.

"Maintaining Your Welding and Cutting Outfits"

"How to Check Ball Bearings"

"Measuring Motor Temperature"

"The Third Overload Relay for Three-Phase Motor Starters" For more on more phases of mine maintenance, see "Maintenance Ideas" every month in *Coal Age*.

questions seem obvious, they are often lost sight of in actual practice. But once the cornerstone is in place the building of a maintenance organization can proceed simply and smoothly on a solid foundation. When complete it will provide all the "should be's" and "should do's" that are expected of it.

Maintenance organizations and practices differ within each company, reflecting company policy, type of equipment, size of company is engaged in deep or strip mining or both, and the general concept and basic philosophy held by management.

to its component parts it becomes simple and easy to understand. But why is maintenance so necessary? Here are a few reasons:

1. The effect of maintenance on production costs.

2. Effect on output of the ratio operating to breakdown time.

3. Protection and improvement of capital investments.

The establishment of an organization and the development of maintenance methods must have the support and understanding of top management if it is to be successful. To obtain this it is necessary to prove the value of these steps. Whether support is needed to set up a new organization or improve the services and facilities of an existing program, it is important that management be shown the possible improvements and why the action is necessary. The showing should include, among other things, the following:

 Cost of maintenance in relation to production. This can be shown as a percentage of total cost or in dollars and cents.

Analysis of operating time losses due to lack of maintenance and a rundown of where improvements can be made.

### Maintenance Organization: Development, Responsibility, Authority

FOR REASONS PREVIOUSLY NOTED, there is no master maintenance plan that can be applied to the entire mining industry. Tailoring a maintenance organization to fit the needs of an individual company is a custom assignment—not particularly tough but one that requires good

management, engineering judgment and common sense.

#### Development

A maintenance organization and its program may seem complex when viewed as a whole but when reduced

#### Maintenance Ideas

Data on maintenance productivity in terms of maintenance cost relative to replacement value of repair parts or equipment, or other comparisons which illustrate the point.

Getting the go-ahead from management to carry out the proposal makes it necessary to take steps to measure, control and improve maintenance methods, facilitate proper allocation of men and material and reduce the cost of maintenance services and facilities. These tools include, among others, the following:

- Classified Accounts Simplify paper work and aid in monitoring all areas of maintenance cost and delays.
- 2. Delay and Work-Needed Reports—Keep management (operating and maintenance) informed of the effectiveness of maintenance and of immediate and future maintenance requirements.
- 3. Perpetual Equipment Records

  -Provide data for spotting weak
  machine components, indicate areas
  of high maintenance costs and enable maintenance management to
  determine when machines should be
  overhauled and when machine components should be changed or redesigned to improve performance and
  safety.
- 4. Program Plan and Work Schedule—Enables management to develop an orderly program for scheduling all maintenance work and assigning men so that it can be performed at designated intervals and completed within established time limits.
- 5. Maintenance Standards—Give management the necessary tools to evaluate work performance, job costs and methods of work procedure.

During development of the maintenance organization specific requirements in the administration of the program should be given priority. These consist of:

- An organization capable of performing all maintenance functions effectively.
- An organization chart listing the responsibilities and authority of each maintenance supervisor.
- 3. A neutral reporting medium or operating and maintenance department heads, including a rigid chain-of-command policy within the maintenance department and be-

tween it and the operating department.

- A preventive maintenance program.
- 5. An effective cost-control program.
- 6. A complete report and record system.

7. A good supply system.

Whether the maintenance department is looked upon as a necessary evil or as an important part of the over-all company organization depends on whether its basic functions are understood. These functions quite often are misunderstood by operating as well as maintenance personnel. Therefore, it is essential to establish the main objectives and make them known to all concerned.

#### Responsibility

Whether or not one function of a maintenance program is more important than the other is secondary. The No. 1 goal is to prevent or at least minimize production breakdowns. This can only be accomplished by providing adequate manpower and service facilities to effectively carry out the assigned responsibilities. The functions for which the maintenance department normally is responsible are:

- Services and Facilities Plan and supervise methods of equipment inspection, preventive maintenance, emergency and running repairs, equipment replacement, and scheduling and overhauling of equipment.
- Utilities—Provide and distribute AC and DC power, communications, compressed air, water and other required utilities.
- Technical Training and Counselling—Conduct maintenance training programs and provide consulting service for management, production supervisors and maintenance personnel.
- Reports and Records—Establish and maintain a system for reporting and recording information regarding equipment, production delays and maintenance costs.
- Equipment Improvement and Safety – Improve equipment design to increase efficiency and safety.

This list of responsibilities provides a basis for developing a maintenance organization. The list can be expanded to include other areas of maintenance or reduced to limit the duties of the department. The final version rests with the individual company. When complete this list should be made known throughout the organization. Also, it should be studied to determine just what is involved in fulfilling each responsibility.

Function No. 1 ("Services and Facilities"), for example, will in effect, minimize machine breakdowns. This requires that equipment be kept in good condition to produce at high production rates by taking the necessary preventive maintenance steps. In addition, the operation should be performed in a maintenance-like manner and the cost kept within the budget.

#### Authority

What is organization but the establishment of authority, responsibility and relationships to achieve the end results? Authority and responsibility, in a sense, are one and the same. Certainly a person or department should not be burdened with responsibility without authority to follow through.

Since the responsibilities have already been established, delegating authority logically follows as the next step in organizing. But before dealing with authority and its relationship to responsibility, it would be wise to establish supervisory titles.

Quite often companies place too much emphasis on the title rather than the job. Still others tend to ignore titles or give them very little meaning. A good rule for assigning titles to maintenance-department supervisors is to follow the same system employed by other departments within the company. The production department, for example, almost always has an effective title system. Generally, the setup includes a general manager, general superintendent, mine superintendent, mine foreman, assistant mine foreman, general night foreman, section foremen, supply or fireboss foreman and others as necessary.

Similar care in giving titles and allocating responsibilities would insure equal results in clearing up confusion concerning duties in the maintenance department. If the production setup can be used as a guide, the following indicates how mainte-

nance titles and responsibilities might be adapted from production.

Maintenance superintendent-General superintendent.

Assistant maintenance superintendent—Mine superintendent.

Chief electrician—Mine foreman. Equipment inspector — Assistant mine foreman or general night foreman.

Production-shift maintenance foreman-Section foreman.

Third-shift maintenance foremansupply or fireboss foreman.

It should, however, be pointed out that while titles between the two departments are similar, final authority logically and legally rests with the operating department.

Unfortunately, maintenance titles in the mining industry vary all over the lot but an effort to standardize is being made. The title of master mechanic, for example, is being replaced by maintenance superintendent. But some companies continue to refer to the chief electrician as the mine electrician.

Title assignment is one area of maintenance structure where management needs applied common sense. Each supervisor should be given an appropriate title—one that matches his responsibilities and authority and one that "flavors" his position with respect and prestige. After all these things mean as much to him as they do to men on the operating side.

Authority associated with maintenance responsibilities should be based on analysis of the job to be done. It also should be defined and contain little or no overlap if confusion or buckpassing is to be avoided. Equally important is the allocation of supervisory talent. Two pitfalls to avoid are: (1) shortage of supervi-

sion, and (2) waste of supervisory talent.

The problem confronting most mining operations today is a shortage of supervision. If too many men report to one supervisor or too large an area is under the control of a supervisor he will not have sufficient time to devote to any one problem. It is unrealistic to expect, for example, a chief electrician to control all maintenance work including trouble-shooting, shop activities, special installations, and servicing on three shifts without help, especially at large and medium-sized operations.

The company very rarely receives full benefit from such a setup. There are always some things that do not get the attention they require. Eventually this causes breakdowns which add to the cost of labor and material and interfere with production.

It is not implied that there should be a supervisor for each and every job. This could result in a waste of talent. It is, however, recommended that there should be supervisors on each shift and especially on the third shift where maintenance crews service and repair equipment to prevent breakdowns during the production shifts. Rarely can you depend on an hourly employee or production supervisor to take the same action as a maintenance supervisor.

The number of first-, second- and third-shift maintenance foremen will depend on the size of the operation and the amount of equipment requiring attention. In any case, keep a maximum number of men reporting to each supervisor but do not over-do it if you expect good results.

It is necessary to establish lines of authority between first-, second- and third-shift foremen. There are two avenues of approach: (1) give the first-shift foreman control over the second- and third-shift, or (2) delegate authority to each shift foreman, thus placing them on the same level in the organization.

Each approach has certain benefits. The first places the responsibility on the second- and third-shift foremen of operating according to policy,

methods, procedures and schedules as outlined by the first-shift foreman. The second gives foremen the responsibilities for quality of workmanship, informal control over men and allocation of work on his section or sections and shift.

In the upper echelon of the organization the maintenance superintendent, assistant maintenance superintendent, chief electrician, equipment inspector and special engineers or supervisors also have their specific place in the organizational setup, each position with its necessary degree of authority.

The desirable of

The desirable chain-of-command policy today is to provide a common or neutral reporting medium for production- and maintenance-department heads. The general manager or a position of equal status has proved the more appropriate. This will not only reduce friction between the two departments but will, in most cases, stop the buckpassing in many organizations.

Nothing can destroy the effective ness or purpose of a maintenance department, or production organization for that matter, more than uncertainty regarding responsibilities and authority. An organization chart showing the status of each supervisor accompanied by a detailed description of duties will help stamp out any misunderstandings that otherwise would arise—provided, of course, that the information is made known to all employees within the company.

#### Maintenance Personnel: Selection, Training

THERE IS NO PLACE in a maintenance organization for men who are not electrically and mechanically inclined, who do not have the interest of the company at heart and who do not have the ability to serve as maintenance foremen or the potentiality to become such. One way of getting men with the right attitudes is careful avoidance of politics in the selection of maintenance personnel.

#### Selection

The best insurance a company can have against hiring unqualified sup-

ervisors or workers and the best way to overcome the present shortage of maintenance personnel is to establish a system of personnel selection aimed at obtaining and qualifying good men. It does not have to be elaborate and expensive. Even in its simplest form it can serve to determine whether a man-supervisor or worker—is certified or, better yet, qualified to perform the duties that will be expected of him.

It is only good common sense to select men with the ability to do a job rather than to hire somebody just because you need another man. The

#### Maintenance Ideas

risk in selecting supervisors, who actually control your profits, requires more than the catch-as-catch-can method. The day of selecting maintenance personnel on the basis of friendship, favoritism and nepotism has passed. Good selections mean lower turnover costs, better employee morale, better production and lower costs of training.

Since there is a definite shortage of maintenance personnel, the best way to elieve the situation is to set up a training program within the company. This can serve two purposes: (1) measure the abilities of trainees to become good maintenance men and also their potentiality as supervisors, and (2) provide training for those who measure up to the qualifications.

#### Training

Basically a training program must be designed to meet the needs of the company. Since the technical requirements for maintenance men are increasing, the program should include (a) fundamentals course, and (b) advanced course. The goals of such programs should be to improve the ability and efficiency of the men by giving them down-to-earth courses that will apply to their daily work routine. Many programs have failed because they were designed to teach theory alone rather than actual needs plus small doses of theory.

The fundamentals course should be designed to give trainees the basic information necessary for them to serve in the various fields of maintenance with which they will be associated. A certain amount of theory is necessary if they are to learn the how and why of things. If the training program is presented in language that they understand and theory kept to a minimum, the trainees, if determined to pursue maintenance, will complete the course. If, on the other hand, some drop out for any reason, its better for them to do so at this point than to waste more time and money.

Before a training program can be set up it is necessary to consider some of the problems that are likely to be encountered.

1. Will the program be sponsored by the company alone or in conjunction with a vocational school? Many companies throughout the industry have established maintenance training programs within the organization (Coal Age, January, 1958, p 110), or jointly with vocational schools or coal operators associations (Coal Age, December, 1958, p 90).

2. Who will attend the program? In addition to training maintenance men, it also is desirable to include operating supervisors and equipment operators. While supervisors need not be required to know the details of maintenance they should know what good maintenance means and how to go about getting it—and also keeping it. Equipment operators should be made aware of what good operating practices mean with regard to high production and low cost, and also what they can do to prevent machine delays and breakdowns.

3. What are the training needs? This is primarily an individual problem. The company will profit most if their needs are included in the course of studies. This aim should remain uppermost in the minds of those who are developing the program.

4. What methods and techniques will be used? Approach the program with a down-to-earth attitude and stay away from theory as much as possible. A variety of techniques will increase interest. A good mixture of techniques include: (a) lectures from company managers and supervisors as well as lectures and demonstrations from equipment manufacturers; (b) visual aids, such as, motion pictures, charts and graphs, and trade literature, and (c) class participation, including general discussions, question-and-answer periods and recitation.

5. Where will the training take place? Normally, the company provides a meeting place and furnishes training equipment. When the program is co-sponsored by a vocational school, most classes are held at the school.

6. How will the courses be scheduled? The program is usually held after working hours and on a voluntary basis. In scheduling after-work programs, consideration must be given to (a) number, length and frequency of sessions, and (b) time sessions will start and end. As an alternative, depending upon individual company aims and policy, the man may go to school full time for the required period.

7. How large a group will be permitted to attend the courses? The size of the group is normally controlled by classroom and laboratory facilities. In classrooms the average number of participants that can be handled efficiently ranges from 25 to 35, provided space is available. The average size of laboratory classes ranges from 10 to 20 depending on experimental equipment available.

8. Who will teach the course? Supervisors with formal training and those with many years of experience are the best instructors.

All training programs should include courses for maintenance supervisors. There are a number of courses that can improve maintenance supervision and also prepare supervisors for possible advancement. The courses should include, among others, the following:

1. Organization training.

- Employment policy and procedure.
- Maintenance policy and procedure.
- 4. Contract interpretation.
- 5. Report-writing technique.
- 6. Communication policy.
- 7. Public speaking.
- 8. Human relations.

#### Maintenance Procedure: Policy, Practice

POLICY IS THE GOVERNING PRINCIPLE, plan or course of action followed by the maintenance department to achieve a sound and effective program. Practice is that part of the program designed to carry out the policy. Both policy and practice,

however, are controlled, in part, by the operating department and should have the approval of the department heads before any procedure is adopted. At this point it is essential that both the operating and maintenance departments confer with the top echelon of management for final approval.

Essentially, the maintenance policy must include provisions for accomplishing all the responsibilities under the maintenance department.

#### Policy

All work activity of the department can be divided into five classifications:

- 1. Preventive maintenance.
- 2. Repair.
- 3. Overhaul.
- 4. Construction.
- 5. Salvage.

Policy must include planning and scheduling of work, and a work force to satisfy the requirements of all work activities. However, the five work-activity classifications can be further defined and broken down into three categories:

- 1. Predictable Work Preventive maintenance is predictable. It thus can be accurately planned and scheduled, and can be placed on a standard-time basis for cost-control purposes. It is, in itself, a special function of the department and should not serve as a means of handling the unpredictable work, such as, breakdowns and troubleshooting.
- 2. Unpredictable Work This phase of maintenance, which cannot be controlled except through good preventive maintenance practices, does not lend itself to the establishment of standards or to any form of planning or scheduling. The unpredictable, however, must be accounted for in the overall work-allocation and work-force program.
- 3. Optional Work—Overhaul, construction and salvage work fall, more or less, into a special category and are essential operations in any good maintenance system. These, understandably, can be classified as predictable work. But because they require a different approach to work allocation and work force they must be placed in a separate category. In addition, this work can either be contracted or performed by a work force maintained by the company.

Once the maintenance program has been broken down into its simplest form, definite policies can be established to assure effective maintenance procedures. Preventive maintenance, for example, requires that equipment be inspected at regu-

lar intervals, that routine repairs be made when needed and that equipment be properly lubricated. These requirements, along with many others, are adopted by the maintenance department. Moreover, policy designates how, when and where the requirements will be fulfilled.

#### Practice

Essentially, the goal in maintenance practice is to see that plans, schedules and work forces are sufficient to carry out the policies of the department.

Of the three categories previously listed, predictable work or preventive maintenance offers the best means for achieving the greatest savings in maintenance costs. Not only does it keep costs down but it also enables the production department to maintain a high level of production and stabilize operating costs.

Preventive Maintenance – What is preventive maintenance? Fundamentally, it is any act or form of maintenance that tends to prevent equipment breakdowns during production shifts. Just how much preventive maintenance is necessary or desired depends on the individual company. The important factor to remember is that a preventive-maintenance program should be designed on the basis of "maintenance for low-cost production."

What might seem to be a logical approach to a maintenance problem from an engineering standpoint may not prove economical. Consequently, each phase of a preventive-maintenance program must be evaluated from an economic as well as an engineering point-of-view. With these factors in mind, a well designed preventive-maintenance program can yield greater benefits than the cost of the program itself. Among these benefits are:

- 1. Minimum production downtime.
- Fewer major repairs and overhauls.
- Less man-hours spent on overtime.
- 4. Less maintenance costs-labor and material.
- 5. Fewer spare-equipment units.
- Better control of spare-parts units.
- 7. Greater safety for workers.
- A preventive-maintenance program cannot or at least should not

be designed and installed overnight. Consensus is that it is too big and important to approach it in a whirlwind fashion. For the sake of simplicity it should be approached, first of all, as a function of minimizing breakdowns through periodic inspections to uncover conditions causing production delays.

The success of the program depends, in part, on inspections. Questions that usually come up at this point are:

What to inspect?
What to inspect for?
How often to inspect?
Who should inspect?

To start with, every piece of equipment should be inspected. The type of inspection and the frequency will vary with the amount of use, treatment, importance, etc. Basically, however, each unit should be inspected at least daily by the section maintenance man. These daily inspections should be supplemented by special inspections at longer intervals of up to a week or a month, depending on the type of unit and experience. Normally such inspecting would involve going into some cases and other more thorough and detailed examinations. In other words, the machine is given a more thorough examination than would normally be involved in a quick daily once-over, which is performed by section mechanics.

Inspections may be made by the regular section electricians or mechanics, or by special men from the mine or central shop. These men at the same time can make certain adjustments and repairs, and can note larger jobs that may require taking the unit out of service.

Several maintenance organizations now employ one or more electrical-mechanical inspectors. Their primary duties are to plan and conduct inspections of all equipment; make out equipment reports and submit them to responsible operating and maintenance heads; make sure that work orders are carried out and completed as scheduled; and recommend when certain equipment should be taken out of service for overhaul.

Once the inspection program has been established and developed to the point where inspection records indicate the need for preventivemaintenance measures, and also

ial

#### Maintenance Ideas

provide maintenance men with data for making recommendations, preventive-maintenance activities can be expanded. Profitable areas in which expansion can take place include:

 Selectivity in scheduling work to realize the most from the money and time expended.

2. Frequency of performing scheduled work.

Sufficient work force to complete scheduled work.

Scheduled work includes servicing the equipment, such as, lubrication, checking and inflation of tires (trucks at strip pits and rubber-tired equipment underground), cable maintenance and repair, and other similar operations.

Major inspections involving some opening of cases and enclosures, and also major repairs or replacement jobs normally are done during idle periods. Part of this work, such as, inspection and replacement of certain units and assemblies, may be done at regular intervals, and part will be done when necessary to avoid a potential breakdown or take care of an actual one.

This work normally falls to special groups, which may be: (1) permanent task forces, (2) special groups of men normally employed in the underground or field show—or the main shop, or (3) temporary groups made up by assembling the regular section or pit men on off-shifts or idle days. Similar task forces normally handle the maintenance of preparation plants.

Troubleshooting—The unpredictable work, which consists of emergency repairs during production shifts, cannot be controlled. However, a good preventive-maintenance program minimizes emergency repairs, which results in increased production and lower operating costs.

A fast hard-hitting troubleshooting force is essential in all maintenance organizations. Troubleshooters can be stationed in the outside shops, on each section or in centrally located inside shops. Whatever the system there must be sufficient number to handle breakdowns, even if several breakdowns occur at the same time on one or more sections. Troubleshooters should be given enough work to keep them busy during periods of no breakdowns.

There is little argument anent preventive-breakdown maintenance. Actually, it is better to budget for a good preventive-maintenance program rather than to attempt to budget for breakdown maintenance. You usually lose two ways in a breakdown-maintenance program, (a) cost of emergency repairs, and (b) lose of valuable production time.

Typical setups for face maintenance or troubleshooting are one mechanic for one or two units underground, and one or more men for each major class of equipment in the larger stripmines. However, organization is subject to considerable variation, and at smaller operations, or at operations with certain types of equipment or a rather simple and rugged nature, running maintenance may be handled by one man or one man and a helper.

The basic principle is assignment of sufficient specialists to a unit or a group of units to keep breakdowns to a reasonable minimum, since overmanaging runs up the cost in excess of the benefits in additional lost-time reduction. Economical maintenance requires proper manpower.

Overhaul, Construction and Salvage Work-This work can be contracted or performed by a work force maintained by the company. It also is predictable and can be put on estimated cost and time schedules. The problem is to determine whether or not it pays to contract the work or to maintain a working force to do it yourself. Cost is the primary factor to consider. The type and amount of work must be weighed carefully. Maintenance cost as well as the cost to the company warrants close study with regard downtime and quality performance.

Since this phase of maintenance usually requires complete overhaul of a machine, underground units and small stripping units are brought to the shop, or sent to an outside custom shop, whichever the case may be, for dismantling and rebuilding, and large stripping units are moved back from the face or out of the pit to prepared overhaul areas.

Other work activities, such as, the repair of conveyor belts, large truck tires and similar items also are included in this phase of maintenance. Some companies maintain special shops or shop sections for this work while others use custom shops or manufacturer's repair and service facilities.

Since overhaul, in addition to skill in dismantling and assembly, requires, as a rule, basic skills in metal-working and the like, and normally also requires bringing the equipment to the main shop or a prepared overhaul area, maintenance men handling this class of work are largely kept on it alone, though certain men occasionally may be sent into the mine or pit to handle certain face or field jobs. The number of men and the specialties involved again depend upon the situation at the particular operation.

Six of the standards for determining when overhauling is necessary are:

- 1. Elapsed time.
- 2. Operating time in hours or days.
  - 3. Tonnage or yardage handled.
  - 4. Inspection.
  - 5. Personal judgment.
  - 6. The maintenance-cost level.

Each of these standards has its supporters among maintenance and operating men, though more of them seem to operate on the basis of a combination of inspection and hours operated, or tonnage or yardage handled. Where the number of units is large, on the other hand, supporters of the elapsed-time standard point out that a rigid schedule is necessary to permit getting around to all the machines without jams resulting from two or three coming up for overhaul.

Although industrial engineering has not yet been applied to maintenance in the mining industry to any degree it does show promise of providing management with another tool to increase the effectiveness of maintenance and to reduce maintenance costs. Equipment and production techniques of today will influence the maintenance techniques of the future—and industrial engineering will play a major role.

Industrial engineering can serve maintenance organizations in a number of ways. These include, among others:

- 1. Simplification of work.
- Improvement of shop layout and facilities.
- Establishment of standard times for specific jobs.
- 4. Elimination of unnecessary job functions.
- 5. Increasing the effectiveness of planning and scheduling of all maintenance work.

## Questions

### We've been asked about the Yieldable Arch

"When using Yieldable Arches as we advance a drift, is it necessary to install temporary props for support?"

Not at all. You can usually install the Yieldable Arch right next to the breast of the drift. This brings the overburden under immediate and permanent control, without the time and expense of temporary roof support.

And we do mean control, for as soon as the surrounding forces bear down too hard, the Yieldable Arch will "give" a little, instead of collapsing. This allows the overburden to settle gradually until it forms a natural pressure arch around the mine opening.

In cases where the ground is heavy, or otherwise bad, forepoling or spiling will give immediate protection while the Arch is being installed.



"What kind of base or footing should be used with the Yieldable Arch?"

If the bottom of your drift is definitely firm, you can set the Arches directly on the rock itself. Otherwise you should set them on footings. Wood blocks

are frequently used for this purpose; so are short pieces of steel plates, channels, I-beams or other steel "leftovers."

If an acid water condition exists in your mine, it's well to set the Arch legs in concrete. A short length of pipe will serve as a permanent form in which to pour, as shown in the sketch.



"What is the recommended placement of Yieldable Arch sets in curving drifts?"

Curves present no special problems. Place the sets radially, with the normal strut spacing on the *outside* of the curve. Struts for the inside of the curve are simply cut to suit the reduced spacing.

In the case of a pitching drift, Yieldable Arches should be placed perpendicularly to the drift, not vertically. This makes lagging easier, and also tends to distribute loads more uniformly.

#### SEND US YOUR QUESTIONS

Send in your questions concerning the application of the Yieldable Arch or Ring to your mine. We will study your problem and reply as promptly as possible. Write Room 1041, at the address below.

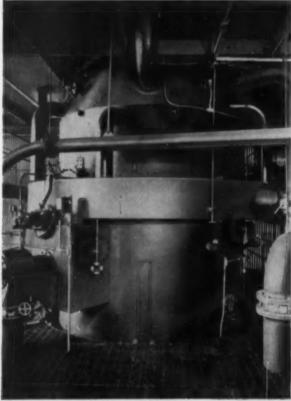
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM STEEL

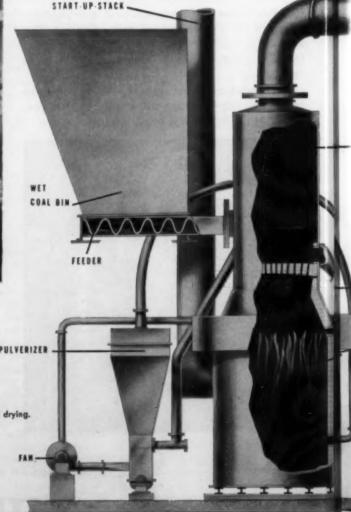


## LEADING PRODUCERS CHOOSE FLUOSOLIDS°

for drying 2,300 tph . . . removing 40,000 gph of water in 7 modern plants

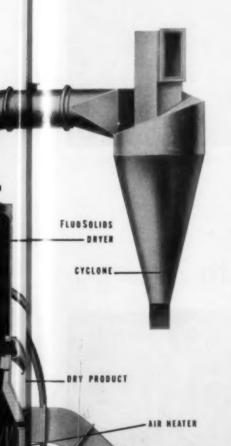


Lower section of FluoSolids system at Peabody Coal Company's installation. Feed variations from 69 to 107 tph and total moisture variations from 10.1% to 22.4% are easily handled.



General arrangement of Dorrco FluoSolids system for coal drying.

LOCATION	START-UP	DRYER DIAMETER	CAPACITY TPH	WATER REMOVAL TPH	FEED SIZE
Indiana	July, 1955	7'	100	10.	14" x 0
West Virginia	Sept., 1957	2-14'	700	70.	%"x0
Kentucky	Dec., 1957	14'	230	25.	%" x 0
West Virginia	Oct., 1958	12'	230	17.	%"x0
Pennsylvania	July, 1959	6'	140	6.5	%"x0
Utah	Nov., 1959	14'	800	25.	11/2" x 0
Kentucky	Oct., 1959	7'	100	11.	%"x0



Since the advent of the first successful application of fluidized techniques to coal drying, many of the industry's leading producers have selected the Dorrco FluoSolids system for coal drying.

The first installation . . . at Peabody Coal Company's Lynnville, Indiana preparation plant, started up in July, 1955. Operating information proved conclusively the advantages of fluidization compared with other methods of thermal drying. Subsequent installations have demonstrated that FluoSolids provides . . .

Wide capacity range—up to 800 tph of wet coal can be dried in a single unit. It is equally economical to dry 75 tph.

Wide size range of feed—system is capable of drying any feed ranging from filter cake on up to  $1\frac{1}{2}$ " x 0 coal.

High water removal—up to 50 tph per dryer.

Controlled completely by instrumentation, operation is semi-automatic thus insuring uniform product moisture. With no moving parts within the dryer itself, maintenance is low and size breakdown is minimized.

Bulletin 7101, just off the press details the complete Dorr-Oliver line for the coal industry. For your copy, write Dorr-Oliver Incorporated, Stamford, Connecticut.





BLOWERS



WITH A CAPACITY of 3,500 cu yd per hour the fourth of the Kolbe Wheels is also the largest (2,100 tons) and can move material over 420 ft via ladder and stacker conveyors.

## The Fourth Kolbe Wheel . . . Two Million Yards per Month

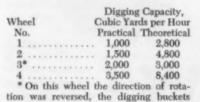




FLEXIBLE BACKS in buckets and roll feeders with each roll operating at a higher speed to eliminate clogging were solutions to the big problems of getting material out of the buckets and over to the ladder conveyor without a hitch in all types of weather.

Five-time increase in capacity over original machine built in 1944 achieved in latest Kolbe wheel operating with 35-yd shovel in 65 to 85 to over 100 ft of burden at Cuba No. 9 mine of The United Electric Coal Cos.

LATEST IN A SERIES dating back to 1944, the new Kolbe wheel excavator, which went into service at the Cuba (Ill.) No. 9 mine of the United Electric Coal Cos. in January, 1959, has a practical capacity 3½ times that of the original. This original, which also served at Cuba until its retirement this year, was rated at 1,000 cu yd per hr. How capacities have increased as experience and design have solved or lessened the effects of a seemingly endless parade of problems is shown in the following tabulation:





Wheel Sparkplug

FRANK F. KOLBE, president of The United Electric Coal Cos., was born in Ann Arbor, Mich., and was awarded both his Bachelor's and Master's degrees in Economics from the University of Michigan, where he taught 3 yr.

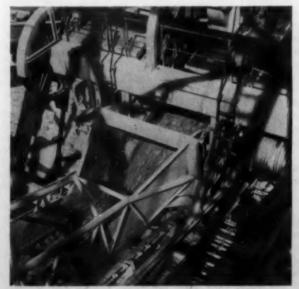
After 2 yr in New York and Washington he joined General Motors and served as assistant treasurer for 6 of his 9 yr with the company. Following this, he was active in private investment trusts for 10 yr, during which time he was also in partnership with Robert R. Young for about 5 yr under the name of Young, Kolbe & Co., members of the New York Stock Exchange. During this same period he was president of the Pathe Film Corp. for 2 yr.

Mr. Kolbe became a director of The United Electric Coal Cos. in 1935 and was elected its president in 1939. He is a director and past president of the National Coal Association and vice president of the Chicago Association of Commerce and Industry in charge of the Transportation Committee. He has served as a member of various other industry organizations. Mr. Kolbe was chairman of a team of experts of the U. S. coal industry that went to Poland in 1957 on an exchange visit.

Mr. Kolbe is a vice president of The Adventurers Club and ex-Master of Fox Hounds of Long-meadow Hunt. He is a member of the Lincoln Park Gun Club, The Chicago Club and Indian Hill Club. Mr. Kolbe is married and has two children.

were replaced with a series of cutting blades, and rotation was speeded up, thus propelling the material tangentially onto an underslung belt by the peripheral speed of the blades.

The new wheel has not been able to demonstrate its capacity in a full month of operation because of intermittent mine operating schedules, but a projection of daily production averages indicates that it will move 2,000,000 cu yd per month operating 80% of the time. This would be about





CRITICAL ZONE is transfer from ladder to stacker belt. Small tail pulley on ladder belt and special idlers in a special mounting were among answers. The new idlers (right) also so lved problems of bounce and rollback on stacker.





WHEEL RESULTS—At left highwall is benched and danger of slides has been minimized. Spoil is neatly windrowed on top of previous shovel spoil. At the right the shovel is spoiling rock in the open pit, Ample room and elimination of the need for careful placement materially eases the shovel's job.

a five-time increase over the capacity of the old Marion 5600 shovel used as the base.

The first wheel was mounted on the revolving frame of a Marion 350 dragline which moved 200 cu yd per hr, or 100,000 cu yd per mo. When rebuilt into a wheel the unit moved five times as much, or 1,000 cu yd per hr. In the year ended July 31, 1958, the last full year of operation, this wheel moved 5,558,000 cu yd. Allowing for idle time as a result of lack of coal orders, it moved about 550,000 cu yd per mo.

The second (Buckheart) wheel was built on the frame of a Marion 5480 dragline that had moved 400 cu yd per hr. In the year ended July 31, 1958, this wheel moved an average of 1,864 cu yd per hr (all yardage figures bank measurement). Of course, the increase in output over fast modern shovels with lighterweight buckets would not be as great.

This steady increase in capacity reflects major research and development efforts and the solution of a number of expected as well as unexpected problems ranging from eliminating belt freezing to cushioning the impact of boulders weighing a ton or more traveling at speeds up to 1,000 fpm on belt conveyors. As it stands today the wheel has a circlerail diameter of 45 ft. The largest rail on any shovel or dragline so far built is 37½ ft.

Weight of the machine is 2,100 tons compared to around 1,000 tons

for the first unit at Cuba. It can move dirt a maximum distance of 420 ft plus 25 or 30 ft of throw off the end of the stacker belt. Digging can be done at points ranging from 9 ft to 100 ft above the coal, and maximum height of spoil discharge is 119¼ ft, also above the coal.

Development of the Kolbe wheels started in February, 1943, and involved, among other things, a half-dollar for a compass and a ruler owned by a junior member of the Kolbe clan as a scale in working up the first rough sketch. The situation giving use to the idea was outlined in a report on the wheel development by Mr. Kolbe in the March, 1955, issue of Coal Age, in part as follows,

"What coal stripping needs is a more economical method of moving dirt. That is the only conclusion we can reach when we look at how thin-cover reserves are being used up, confronting most companies with the job of taking off 50 to 80 ft of material to maintain their production. We, too, began to meet up with this problem several years ago, and were impelled into a search for a stripping unit that would cost less to huild and operate per unit of capacity . . ."

"We had three goals in our investigation of possible new stripping methods and techniques:

"1. To handle overburden up to 85 ft and place the spoil far enough back to avoid slides.

"2. To cut costs per cubic yard below those possible with any present machine of equal size. "3. To leave any overburden not moved by the new machine so low in height that the efficiency of the accompanying shovel or dragline would be increased."

Investigation of all possible methods of moving overburden cheaper covered the shovel, walking dragline, hydraulicking, throwing spoil across the pit, car transporter, tower excavator and belt conveyor.

"Of all the methods of moving high overburden to the spoil, the belt conveyor appeared the most feasible for our purpose. Conveying by belt is a standard process, though not as standard as we first thought, and is low cost where there is volume. Volume, of course, is one thing we do have.

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"The material we would be moving would be largely dirt and shale, which are ideal for a belt, but occasionally we would be encountering rocks up to 1½ tons. And frost lumps also would be a problem, since our ground freezes 2 or 3 ft deep and breaks up into pieces up to 4 ft square. However we felt that almost anything could be carried on a belt if the idlers were strong enough and close enough together, if the material could be put on the belt without impact, and if—the big if this time—the engineering was right."

Having decided on a belt to convey the material the next problem was how to dig it and put it on. By March, 1944, investigation showed that the wheel was the logical unit, leading to the exercise with the half dollar and the school ruler. A con-

First all-new off-road truck in a quarter-century . . .



## LW Haulpak®

#### Moves more tons per man-hour

Here it is: the revolutionary LW Haulpak...introduced by LeTourneau-Westinghouse after more than 3 years of research, development, and field-testing. All new from the wheels up, Haulpak gives you highest output at lowest ownership and operating costs.

Haulpak gives you a hauler built to heavy earthmoving standards, not merely automotive specifications. Many parts and assemblies are identical to those used on thousands of jobs on famous LW Tournapulls. With Haulpak, your maintenance, repair, and operating costs will drop to a new low...and your hauling tonnage will climb to new highs.

Detailed specifications are ready. Ask for them!

Although brand new, Haulpak is fully field-tested. These machines have been put through rugged tests under laugh working conditions for over 14 months — in mines, quarries, and on construction jobs. Here a Model 27 Haulpak gets a heaping load on one of its "test" assignments.

\*Trademark HP-2098-G-

- 22, 27, 32-ton capacities
- 290, 335, 375 hp
- Haul up to 30% more than their own weight
- Need no springs, because they ride on Hydrair\* (exclusive LW air-suspension system)
- Exclusive Y-body for bonusyardage within a short wheelbase...plus a low center of gravity for exceptional stability
- Non-stop U-turns in far less space than conventional trucks
- Powerful, twin 3-stage hoists lift body in seconds to 70° angle for fast dump
- Lube checks of just 4 grease fittings needed only at 500-hr intervals
- Exclusive LW power-transfer differential





LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A. Subsidiary of Westinghouse Air Brake-Company

Where quality is a habit

struction contract for the first wheel was signed in June and patents were applied for at about the same time.

The first machine was completed in 1944 at Cuba mine and was a failure because all the problems had not been solved—in part because some were in areas where it was assumed everything had been worked out. In the ensuing years, the problems tackled and solved included the following, starting at the highwall end and finishing at the spoil end.

#### The Digging Wheel

Wheel output is a function, among other things, not only of bucket size but the speed with which dumping can be accomplished, since failure to complete dumping results in carryover and a limit on capacity. When the speed of dumping is increased the speed of the wheel can be increased accordingly. The final bucket design is along the lines of a dragline unit spilling in its own area, rather than in the space between buckets. This permits putting the buckets close together.

Dirt buildup was a major problem, and remedies considered or tried included heating, lining with stainless steel and mechanical cleaners. Finally, it was decided to make the back of the bucket a mat of chains, these not only cleaning the bucket but helping push the material out quicker. On the latest Cuba machine a futher refinement of the flexible-back idea is rubber belt held in place by short lengths of chain at each end.

Wheel speed may be varied to suit conditions but the normal is 8 rpm. This compares to around 3 rpm for German wheels and represents a major increase in capacity.

One problem in wheel operation is boulders, in turn involving the type of drive. Originally, when the wheel was stopped dead, its inertia, in combination with the inertia of the motor armature, resulted in a wreck. An air clutch was then adopted but study of the problem continued with the result that the present drive is a 30-in-wide Poly-V belt, which helps provide the necessary clutching action to protect motor and reducer against shock loads.

Some of the specifications of the latest wheel are:

Diameter, 27 ft.

Number of buckets, ten.

Bucket capacity, 2.5 cu yd measured and 1.75 cu yd loose material.

Normal rpm, 8; variable to meet conditions.

Motor, 715 hp at 660 rpm continous.

Wheel weight, 90,500 lb.

Weight of entire digging assembly, 476,000 lb.

Swing speed at digging point, 50 to 80 fpm.

Maximum capacity, 18-in cut depth, 4,800 cu yd per hr.

Maximum depth of cut possible, 36 in.

#### Belt Feeding

After the material is dumped it is necessary to move it sideways and down to the initial, or ladder, belt. The original device was a slope sheet inclined 60 deg. It didn't work, even with, among other things, vibration. The first solution was a roller and scraper plus motor-driven rotating wipers on the slope sheet. In the present model a 4-roll feeder is employed, each roller increasing in speed up to 44 rpm for the one nearest the belt, thus preventing pileups. Among other things this permits the buckets to start dumping at a low position, and also permits using buckets of maximum width on the digging wheel.

#### **Belt Conveying**

In the Kolbe wheel the material is transported on, first, a belt on the ladder carrying the digging wheel and, second, on a final stacker belt. When the wheel was conceived, as Mr. Kolbe pointed out in his report in the March, 1955, issue of Coal Age, it was expected that there would be no problems in this area. But there were, including the following:

Speed of Operation—No belt, as far as was known at the time the first stacker was built, had been operated at over 600 fpm, but much higher speed was essential for a practical design. Among other things, higher speed cuts down belt width and the weight and bulk of conveyor and supporting structure. On the present Cuba wheel the 60-in ladder belt, with a length of 245 ft, runs at 910 fpm, while the 700-ft stacker belt runs at 1,225 fpm.

Checkmating Ice—With the lowspeed belt installation on the first wheel a major problem was freezing of the material several inches deep on the belts in subzero weather. Heat was about the only out until the belt, for other reasons, was speeded up. That solved the problem.

Belt-to-Belt Transfer — This was a critical factor in design of the Kolbe wheel, since the handling and transfer problems were complicated by rocks weighing up to 1½ tons and in the wintertime, large frost lumps. Shock problems in dropping such items 8 to 11 ft were outsize even with a belt speed of only 450 fpm. Increasing belt speed aggravated the problem. It was decided that the only answer, in spite of conventional belt-conveyor-design ideas, was a smaller tail pulley.

This smaller pulley, cutting the drop to 3 ft, plus special suspension idlers, solved the problem. The suspension idlers are held on a rubber cushion at each end for additional shock resistance in the transfer zone. Integral with the ladder are skirt boards 60 ft long which travel up and down the stacker conveyor as the ladder conveyor is advanced and retracted to guard against spillage in the transfer zone.

Since the wheel, as noted, can dig from 9 to 100 ft above the coal, and consequently the angle of discharge from ladder to stacker belt can vary widely, the transfer zone is a critical area. The new design permits transfer with a minimum of rolling and bouncing.

Suspension Idlers — Unusual loads and shocks in belt operation quickly indicated the need for special idlers after the first wheel went into service. The idler design that met the problems was developed by J. J. Huey and Chris Stamos, of the United Electric organization. It consists of small rollers approximately 6 in wide fastened together by pieces of roller chain so that the idler hangs in a catenary curve. Advantages noted by Mr. Kolbe are:

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1. The idler rocks with the blows. This was one of the serious problems encountered in the operation of the stacker, and development of the idlers completely solved the problem of boulders and frozen material



# For shallow stripping, this scraper's your best bet

gives you year-round service with interchangeable L-W Rear-Dump



Time means money when you're stripping varying depths of overburden in your pit. If overburden is free of rock, and is shallow and wide-spread, crawler-type excavators—such as shovels, draglines and crawler dozers—move slowly to new work areas, increase your costs. Furthermore, they can only dig and cast... require other machines to haul spoil to out-of-the-way disposal areas.

Self-propelled scrapers move shallow, non-rocky overburden at lowest cost per ton. Since stripping is a periodic job, most scrapers are sidelined many days during the year because there is not enough steady work. Not so with LeTourneau-Westinghouse C Tournapull®. When you finish stripping, you simply interchange its 18-yd scraper for a 22-ton Rear-Dump trailing unit. Thus your 210-hp L-W prime-mover works productively for you all the year-round for greater profit.

Cost of the interchangeable hauler trail unit is only 35% of that of prime-mover and scraper combinations. Other interchangeable L-W work units include Bottom-Dump, Side-Dump, and Flatbed haulers.

#### Tournapull "extras" speed operations

All off-road L-W Tournapull units have easy maneuverability for work in restricted quarters, instant electric control of all work functions. They have powerful brakes (largest in the earthmover field), dependable power-steer, and exclusive, power-transfer differential which keeps these machines working in soft going when other haulers bog down.

All-around usefulness, and interchangeability of hauled units make L-W 'Pull' a sound investment for your pit. Ask for complete specifications, and a demonstration.

†Tredemark CPCR-1867-MQ-1



LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

bouncing and rolling back on the stacker belt.

- 2. Weight is only a fraction of that of the conventional type.
  - 3. Cost is less.
- 4. Two men can change an idler in a minimum of time, whereas changing a conventional unit is a major job.
  - 5. The belt tracks much better.
- 6. Shape of the catenary curve can be adjusted by nuts to make a smooth belt path.
- 7. The supporting structure is simple.

8. Space under the idler is open, and there is nothing for dirt to build

9. Contact between belt and idler is much improved.

The 60-in stacker belt on the present Cuba Wheel is 5-ply with 7/16 in top cover, including five nylon cord breakers (one longitudinal and four bias), and 3/32-in bottom cover, including one longitudinal breaker.

Electric Power - Two 900-hp m-g sets supply operating power to

the following motors on the new Cuba wheel:

Wheel drive, 83.14:1 reducer, 715 hp, 660 rpm.

Ladder-belt drive 3.97:1 reducer, 250 hp, 1,200 rpm.

Ladder crowd drive, 4.38:1 reducer, 100 hp, 430 rpm.

Roll-feeder drive, 40 hp, 1,170

Stacker-belt drive, midway of conveyor, 10.076:1 reducer, two 400hp, 660 rpm.

Swing drive, two 35-hp, 700 rpm. Propel drive, four 150-hp, 1,200

#### Stripping at Cuba

Recovering the Illinois No. 5 with an average thickness of 4.75 ft, Cuba No. 9 mine operates a Bucyrus-Erie 950-B shovel with 35-cu yd dipper in tandem with the wheel. Overburden in the present pit ranges from 65 to 85 ft up to over 100 ft in thickness. At low depths some 10 to 15 ft is soft top material; at maximum depths one-third to one-half is soft material that can be handled by the wheel if desired.

In operating the wheel it is positioned at an angle in the lower banks and nearly square across in the higher to get the maximum distance in spoil disposal. The wheel is placed against the edge of the spoil and advanced to the desired depth and then the machine is swung to cut an approximately quarter-circle path to the back of the cut, spoiling in a similar quarter circle. Move ups are made usually every 50 to 60 ft.

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Spoil is placed up to three rows back and is laid down in a stream without the jarring that accompanies dragline dumping and which can trigger slides. The wall on the bank side is left in a curve and benched so that slides into the pit are prevented.

The shovel normally has a much better opportunity for high performance in digging and spoiling. The spoil area is free and of maximum width so that, among other things, there is no necessity for care in placing. Rather, all the operator needs do is swing and let fly. Also, since the spoil can be kept back it does not encroach on the coal and thus there is no loss in loading.

Future Kolbe wheels will be built by Bucyrus-Erie under a licensing arrangement recently entered into-

When you order screens, be sure to specify the type which best meets your re-quirements. For example:



For maximum through capacity, CF&I Space Screens with rectangular openings are recommended. The high percentage of open area provides considerable freedom from blinding or clog-



For maximum freedom from blinding or clogging, CF&I Long Stot Space Screens are the most efficient construc-tion. Because of the open area and intense vibration of wires on the long sides of the openings, material can not cling or build up.



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#### SPACE SCREENS

#### for every coal screening operation

For economical, general screening specify Wisscoloy screening made from special alloy steel. Carefully crimped and tightly woven, Wisscoloy is a rugged, general-purpose screen which provides long service on average jobs.

For corrosive conditions specify CF&I stainless steel screens. These durable screens are ideal for washing and other operations where wet, corrosive material is processed.

For scalping operations specify CF&I manganese screens. Rugged and shock resistant, they withstand the crushing, tumbling and pounding common in scalping operations and similar tough screening applications. Made of 34 or heavier wire, they reduce costly downtime.

For engineering assistance in choosing the right space screen for your coal screening operation, contact our nearest branch office.

6924 B

#### CF&I SPACE SCREENS

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In the West: THE COLORADO FUEL AND IRON CORPORATION—Albuquerque · Amerillo · Billings · Boise · Butto Denver · El Pase · Fermington (N.M.) · Pt. Worth · Houston · Liscoln · Los Angeles · Oakland · Oklahoma City Phoenix · Pertiand · Pveblo · Saft Lake City · Son Francisco · Son Leundro · Seattle · Spokane · Wichita In the Easth WICKWIRE SPENCER STEEL DIVISION—Allanta · Baston · Buffalo · Chicago · Delvoit · New Orloons New York · Phillodelphia. CFAI OFFICE IN CANADA: Montreal. CANADIAN REPRESENTATIVES AT: Calgary Edmonton · Vancouver · Winnipeg



## How FALK Couplings give your connected machinery Double Protection

FIRST: They protect against shaft misalignment. Some degree of shaft misalignment is unavoidable—and unless protective compensation is provided, additional loads are developed on shafts, bearings and other revolving elements. The result is excessive wear-and-tear—and often actual breakage....FALK Steelflex Couplings compensate for either angular or parallel misalignment—or for the more serious condition involving both! The exclusive Steelflex gridmember which joins the two hubs is not fastened to either hub; thus, either hub can shift in any direction without imposing a load on the other hub.

Yet, important as protection against shaft misalignment is to you, it is only one function of the *truly flexible* FALK Steelflex Coupling.

SECOND: They protect against torque fluctuations which create excess wear on connected machines and frequently induce destructive shaft misalignment. The exclusive FALK Steelflex grid-groove design cushions shock loads, dampens vibration, reduces impact loads as much as 30 per cent. You get this extra margin of protection that can mean the difference between operating and breakdown! You save on maintenance costs. And—you prolong the service life of your machines!...For complete information, ask your FALK Representative or Authorized Distributor. Or—write direct for Bulletin 4100.

FALK and STEELFLEX are Registered Trademarks

#### THE FALK CORPORATION, MILWAUKEE I, WISCONSIN

Representatives and Distributors in Most Principal Cities

Manufacturers of Quality Gear Drives and Flexible Shaft Couplings

## Basic Type F FALK STEELFLEX COUPLING fills the needs of 90% of industrial applications

This cutaway view shows the exclusive Steelflex design which provides torsional resilience with the strength of steel. This torsional resilience spreads peak or shock loads over a relatively long increment of time, thus greatly reducing stresses in connected machinery.

The versatile Type F Steelflex can be used horizontally or vertically, without modification or special parts. It is ideally suited to 9 out of 10 applications. For unusual applications involving overload conditions, extended shafts, brakes, etc., standard designs of dual-purpose Steelflex couplings are available.

For most applications, you can give your machines the extra protection afforded by FALK Steelflex Couplings at no extra cost!



## **Get DOUBLE EXPANSION** DEPENDABLE roof support



## roof bolts and expansion she

The unique double expansion feature of all Pattin expansion shells insures dependable roof support, in hard or soft roof conditions. Their double holding power guards against failure
— even under a 20 ton pull!

Pattin features include a parallel contact with the hole, and no definite drilling depth is required, as the shell can be securely anchored at any place in the hole. They anchor solidly and will not turn while being tightened. Wedge and shell are assembled in a manner to prevent loss of parts in handling, and the bolt and shell assembly are furnished as a complete unit. Plates are bundled separately. No special nuts or ears are required on the bolts. These features make a safer roof — and a safer roof means fewer accidents, increased production, more clearance for equipment operation and better ventilation.

Pattin specializes in roof bolting -it's our business, not just a side-line! Your business is important to us, and our service engineers are always available for consultation on your roof problems-ready to give you service when you need it! WRITE OR PHONE US TODAY for complete details.



STYLE

### PATTIN split-type BOLT

The split-type bolt is one of the first slotted bolts, and continens to be a favorite wherever split-type bolts are used. Many mices still prefer this type. The bolt is a full 1-lack in diameter, with cut threads and furnished with how or species with continuous section with a species with

## PATT

The PIONEER of roof bolting . . , established 1888



In most mining companies, all key officials read Coal Age because it helps them do a better job

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## Why the "built-in values" of General Electric Mining Cables are so important to you

Built-in values" make General Electric cables outtandingly successful in meeting the needs of the mining industry. These values result from designing, engineering, and building into these cables carefully developed and selected components and particular construction advantages.

Three examples of these important values are:

Two-layer reinforced lead-cured jackets. Here's how the jackets of G-E portable mining cables are made to resist abrasion, pulling, crushing, and twisting: 1) Lead curing gives a dense, tough jacket with added longitudinal and radial mechanical strength; 2) a strong, twine open mesh is built in as an integral part of the jacket to provide greater over-all tensile strength and radial strength in order to reduce displacement of the core members.

Flexible conductors that reduce breakage. Flexibility and long service life are achieved by special rope concentric stranding of conductors, developed through years of testing and field service.

Insulation with toughness and crush-resistance. Insulation for 600-volt cables, for example, is a GRS heat-resistant rubber compound with excellent electrical characteristics and the necessary mechanical toughness and resiliency for the severe conditions encountered in mining applications.

All General Electric mine cables bear the embossed symbol P-108 of the Pennsylvania Department of Mines, and where required also carry the BM marking indicating listing by the United States Bureau of Mines.

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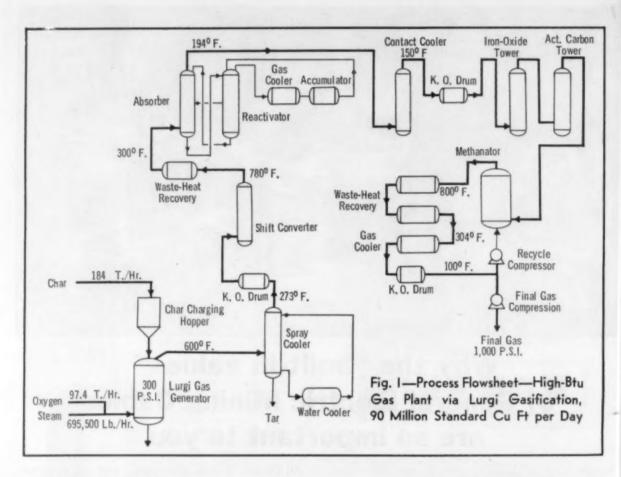
Company

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State



The Economic Outlook for . . .

## Pipeline Gas from Char Via the Lurgi Process

Analysts estimate capital investment of \$76 million is needed to build a Lurgi plant producing 90 million standard cu ft of pipeline gas per day from bituminous char. Per MCF with \$4 char, operating costs are put at \$0.56 and minimum selling price at \$0.72

By Sidney Katell, Chief, Process Economics Evaluation Staff and John H. Faber, Chemical Engineer, USBM, Morgantown, W. Va., and Mare T. Constantine (formerly Chemical Engineer, USBM), Rocketdyne Div., North American Aviation, Inc., Canoga Park, Calif. AN ESTIMATED capital investment of \$76,499,800 will be required for a plant designed and built to produce 90 million standard cu ft per day of synthetic pipeline gas by Lurgi gasification of a bituminous char. This investment figure does not include the pretreatment plant but

does assume that this cost is reflected in the cost of the char fed to the gasification system. Shift conversion, CO<sub>2</sub> removal, and methanation are required following the Lurgi gasification unit before the gas is suitable for pipeline transmission.

Based on a 90% operating factor, or a 330-day operating year, the operating cost before profit and taxes with the char price as a variable will amount to the following:

Char price	Operating cost
Per ton	Per MCF
\$4.00	\$0.56
5.00	.61
6.00	.66

Adding gross return on investment results in the following:

Gross return	Char at	price pe Char at \$5	Char at
ment, %		per ton	4.00
6	\$0.72	\$0.77	\$0.82
12	0.87	0.92	0.97
20	1.08	1.13	1.18
30	1.33	1.38	1.43

The thermal efficiency of the plant, based on a calorific value of

12,000 Btu per lb for the coal, is about 65%.

#### Lurgi Use Today

The conversion of coal to synthesis gas in Lurgi generators is being utilized in many fields. At Sasol in South Africa synthesis gas is converted to synthetic fuels (Coal Age, September, 1955, p 54; British Chemical Engineering, June, 1957, p 308); in Pakistan ammonia is produced from Lurgi gas (USBM Inf. Circ. 7794, 1955, p 32); in Australia the Lurgi gas, after purification, is used directly for heating (Coal Age, September, 1957, p 81). However, in this country its application has been hindered by the caking characteristics of the predominant coals in the areas where the potential products have the most economical appeal.

[Ed. Note: In a project which will probably mark the first U.S. commercial application, the proposed Dynamics Reading Chemicals plant will adapt the Lurgi process for use with non-caking anthracite silt to make bulk chemicals—Coal Age, July, 1959, p 98.]

When considered for the production of a synthetic pipeline gas (900+Btu per cu ft), the Lurgi process has the advantage of requiring less oxygen per volume of gas than the pulverized coal-steam-oxygen, entrained-type gasifier (Coal Age, September, 1958, p 116). There is the additional advantage of the initial Lurgi gas containing from 8 to 15% methane (on a dry basis).

Some work has been done by the Bureau, the Institute of Gas Technology, and others on pretreatment of coal, with the emphasis on the preparation of a pulverized char. For use as feed to a Lurgi, the coal is limited in size to a 1/6-in minimum, and it is conceivable that additional development work will be necessary to provide the pretreated coal at minimum cost.

Here we have assumed that the pretreatment plant is adjacent to the gas plant and near to the coal mine supplying run-of-mine coal.

#### Lurgi Process Described

Shown in Fig. 1 is the process flowsheet for producing a synthetic pipeline gas via fixed-bed Lurgi gasification of a bituminous char followed by dust removal, shift conversion to

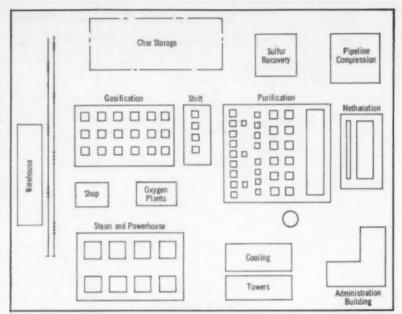


Fig. 2—Plot Plan of 90 Million Standard Cu Ft per Day High-Btu Plant. Lurgi Gasification of Pretreated Bituminous Char Area 600 x 450 Ft

a 3 to 1 H<sub>2</sub>:CO ratio, CO<sub>2</sub> and sulfur removal, recycle methanation, and compression. Lurgi gasification of bituminous char has been carried out experimentally and, further pilot plant data would have to be obtained before any detailed design could be made for a commercial plant. The shift-conversion and purification sections are based on commercial operational data. The methanation system needs additional verification based on pilot plant experimentation.

Process assumptions, however, are as sound as presently possible.

Factors vital to location of the proposed installations are:

 An available supply of Sewickley or similar grade bituminous.

An existing pipeline for transport of the product.

Fig. 2 presents a conceptual plot plan of the plant. The process may be described briefly as follows:

Coal Preparation and Pretreatment

-Run-of-mine coal of the following
analysis is received at the plant:

	%
$H_2$	4.9
C	70.1
S	1.4
$N_2$	1.4
O <sub>2</sub>	6.6
Ash	14.3
Moisture	1.3

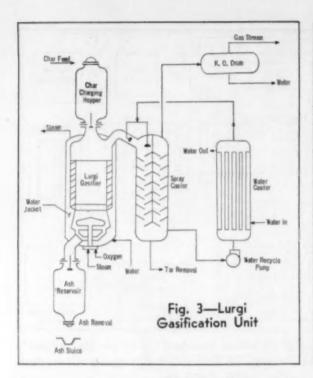
At the plant this coal is transferred from the bottom dump coal cars through a track hopper into hammer mills where the coal is sized for feed to the pretreatment plant.

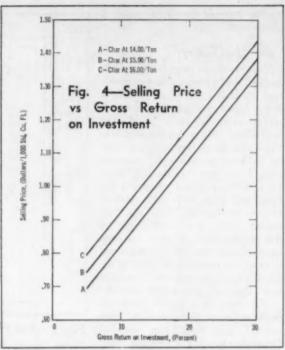
The pretreatment low-temperature carbonization plant, as visualized, will recover profitable byproducts and deliver to the gasification unit a char of approximately the following analysis:

	%
H <sub>2</sub>	3.9
C	72.0
S	1.1
N <sub>2</sub>	1.5
O <sub>2</sub>	3.7
Ash	17.8
Moisture	-

Approximately ¾ lb of char is produced per lb of coal fed to the pretreatment plant. The capital investment and operating cost, as well as credit for the by-products, for coal preparation and pretreatment are assumed to be included in the price charged for the feed to the gasifier.

Gasification—The gasification unit consists of three parallel trains, each made up of six Lurgi gasifiers, one of which is a spare, and attendant equipment as shown in Fig. 3. The gasifier has a stationary bed supported on a rotary grate. The bed is approximately 10-12 ft thick. Provi-





sions are made to permit charging the fuel and discharging the ash through hoppers without interrupting the gas making operation and disturbing the pressure.

The char entering the top of the gasifier, heated by the hot gases leaving, passes through the gasification zone to the combustion zone at the bottom of the gasifier.

The reaction of steam, oxygen, and carbon produces a gas which is relatively free from methane at first, but as the gas rises through the fuel bed its temperature falls, and reactions occur leading to the formation of methane in the cooler zones.

The temperature in the combustion zone, which depends on the melting point of the ash, is controlled by the relative amounts of steam and oxygen fed to the gasifier. A cooling water jacket around the unit is provided to cool the outer load bearing shell. The heat-recovery system, including the water jacket, makes 578,000 lb per hour of steam at 325 psig and 500 F.

In conjunction with each gasifier there is an ash receiver and disposal system. The ash flows into the receiver, which is emptied every 2 hr. The ash is quenched with water and sluiced to the disposal basins.

The rate of ash extraction is adjusted to the generator load. Too high an ash-removal rate could re-

sult in too much combustible material being extracted, while too low a rate could cause the gasification zone to move upward and result in a rise in outlet gas temperature.

The raw gas leaves the gasifier and passes through a spray cooler system where it is cooled to 273 F. The volume of the raw gas at this point is 22.8 million standard cu ft per hr and has the following composition:

H <sub>2</sub> O		0	0				40.2%
H2 .	0.				4		24.1%
CO			4	0		0	13.5%
CO <sub>2</sub>		0			0	0	15.9%
$CH_4$		0		0	0		.5.1%
Other							1.2%

The oxygen required for the process is produced at 99.5% purity and at 325 psig pressure. Before being fed into the gasifiers the oxygen passes through tubular heaters. The power requirement for the oxygen production, approximately 50,000 hp, is supplied by steam turbines.

Water Gas Shift Conversion (conversion to approximately 3H<sub>2</sub>:CO ratio)—Dust-free gas, with an H<sub>2</sub>:CO ratio of 1.79, enters the shift conversion unit at 273 F and 295 PSIG. Enough water is carried in the gas stream to satisfy the shift and equilibrium conditions; therefore, no additional water or steam need be

added to the shift converter unit. There are six converters installed, each containing 890 cu ft of catalyst. M Si P Si C Si P P

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After shifting to a 3 to 1 H<sub>2</sub>:CO ratio, the gas leaves the unit with the following composition:

H <sub>2</sub> O	)		0			0	0	4	0	8.5%
H <sub>2</sub>		0		0					4	0.4%
CO										
CO						0		8	2	8.5%
CH,					0					7.3%
Othe	01	1								1.8%

The gas is passed through a heatrecovery system, where it is cooled down from 780 to 300 F for feed to the purification operation. In the waste heat boiler 154,100 lb per hr of steam are produced at 325 psig and 500 F.

Purification—(reduction of CO<sub>2</sub> from 28.5% to 0.1%)—The gas purification unit utilizes hot K<sub>2</sub>CO<sub>3</sub> at a temperature of approximately 194 F, to absorb the CO<sub>2</sub>, COS, and most of the H<sub>2</sub>S. Iron oxide towers and activated charcoal boxes are included in the system for the removal of the residual H<sub>2</sub>S and organic sulfur.

The purification unit consists of three parallel trains, each containing three hot carbonate absorbers, packed with 20 ft of ¾-in Raschig rings and 40 ft of 1½-in Raschig rings; and five reactivators, packed with 20 ft of 1-in Raschig rings and 40 ft of 1½-in Raschig rings. Attendant

#### Lurgi Gasification of Bituminous Char High-Btu Gas Plant Producing 90 Million Standard Cu Ft per Day . . .

### Table I—Estimated Capital Requirements

11110	
Cost	%
\$18,533,400	24.2
15,000,000	19.6
796,100	1.0
875,000	1.2
10,881,000	14.2
683,600	0.9
3,189,600	4.2
1,561,900	2.0
515,000	0.7
1,800,000	2.4
4,320,000	5.6
5,815,600	7.6
7,676,500	10.0
71,647,700	93.6
607,000	0.8
72,254,700	94.4
1,445,100	1.9
73,699,800	96.3
	3.7
76,499,800	100.0
	\$18,533,400 15,000,000 796,100 875,000 10,881,000 683,600 3,189,600 1,561,900 1,800,000 4,320,000 5,815,600 7,676,500 607,000 672,254,700 1,445,100

equipment includes pumps, reboilers, and gas coolers. Following the hot carbonate unit is a contact cooler to reduce the gas temperature to 150 F before entrance into the iron oxide boxes and charcoal towers.

The composition of the exit gas from the purification system is (%):

H.O	1.3
H,	63.6
CO	21.3
CO2	0.1
CH <sub>4</sub>	11.5
Other	2.2

Methanation—The methanation unit consists of nine reactors. In conjunction with these reactors there is a waste-heat recovery system which produced 322,800 lb per hr of steam at 325 psi and 500 F.

The fluidized bed methanators, which are charged with Raney nickel catalyst, are sized to allow for a space velocity of 7,000 V/V/H (vibration velocity per hour). The gas made from the methanation unit has the following composition (%):

H <sub>2</sub>	5.2
CO	0.6
CO <sub>2</sub>	1.4
CH <sub>4</sub>	86.8
Other	6.0

#### Table 2—Estimated Annual Operating Cost

Direct Cost			%
(a) Raw materials and utilities			
Char-184 tph x 24 x 330 x \$5 per ton \$7,	286,400		
Coal*-37 tph x 24 x 330 x \$4 per ton 1,	172,200		
Water-8,000 gpm x 60 x 24 x 330 x \$0.10 per			
M gal	380,200		
Catalyst & chemicals	652,500		
Sulfur produced—48 per day x 330 x \$25 per ton —	396,000		
		\$ 9,095,300	50.0
(b) Direct labor			
1,200 man-hr @ \$2.25 per hr x 365	985,500		
	147,800		
		1,133,300	6.2
(c) Plant maintenance			
125 men @ \$5,000 per annum	625,000		
Supervision @ 20%	125,000		
Material-50% of labor	312,500		
		1,062,500	5.8
(d) Payroll overhead (18.5% of payroll)		348,400	1.9
(e) Operating supplies (20% of plant maintenance)			1.2
Total direct cost		11,852,000	65.1
Indirect cost			
50% Labor, maintenance, & supplies		1,204,200	6.6
Fixed cost			
Taxes & insurance @ 2%		1,445,100	8.0
Depreciation @ 5%			20.3
Total operating cost		\$18,186,300	100.0

Cost per MCF = 
$$\frac{\$18,186,300}{29.7 \times 10^6}$$
 = \$0.61

With \$4 per ton char, cost per MCF = \$0.56 With \$6 per ton char, cost per MCF = \$0.66 \*Coal for steam plant.

The heating value is 940 Btu per standard cu ft.

The final steps in the operation are cooling of the gas to 100 F and compression to 1,000 psig for pipeline transmission.

#### Capital Investment

The estimated plant investment figures are summarized in Table 1.

Included under "general plant facilities" are administrative buildings, shops, warehouses and so on.

The cost of steam and power distribution, cooling towers, plant and instrument air, fire protection, and sanitary water are included in "general utilities."

Table 1 indicates a total construction cost requirement of \$71,647,700. Adding \$607,000 for the initial catalyst requirement resulted in a total plant cost of \$72,254,700. The cost of "interest during construction" was based on a 2-yr construction period. The total investment, including estimated working capital of \$2,800,000, was \$76,499,800.

#### Operating Cost

Table 2 shows the estimated operating cost summary on an annual basis. A 90% operating factor was assumed for the plant.

With char at \$5 per ton, labor at \$2.25 per hour, payroll overhead at 18.5% of labor, depreciation at 5% of total investment, the annual operating cost is shown to be \$0.61 per standard MCF. With char at \$4 per ton, the cost is decreased to \$0.56 per standard MCF and is increased to \$0.66 per standard MCF with char at \$6 per ton. At \$5 per ton the char cost represents 46% of the total operating cost; at \$4 per ton it amounts to 37%, while at \$6 per ton the percentage rises to 55%.

Gross return on investment versus selling price is shown in Fig. 4

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Today's mining equipment built with USS High Strength Steel, super-strong USS "T-1" Steel or USS Stainless Steel is the biggest, brawniest and most durable ever made. It's true that these steels cost more per pound in most cases, but fewer pounds are needed. They cut dead weight, increase payload, boost service life, reduce downtime and save operating dollars. Every dollar you spend for these stronger, tougher, more abrasion-resistant steels puts money in the bank. For example, "T-1" Steel bucket teeth have outlasted other teeth from five to 10 times . . . and stainless steel filter screens have lasted 50 times as long as the material they replaced.

USS, COR-TEN, MAN-TEN, TRI-TEN and "T-1" are registered trademarks

Here are the USS Steels that do more:

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Stainless Steel vibrating screen handles more than 400,000 tons of run-of-mine coal at Island Creek Coal Co., Holden, W. Va. Present unit has lasted more than a year. Cost of screen runs about 0.3 cents per ton of coal processed. The same story of low-cost operation holds true at other mines where stainless steel is doing yeoman duty. Stainless Steel coal chutes eliminate the build-up of coal caused by week-end corrosion of the old chutes. Service life is greatly increased. Stainless vacuum filter screens remain in service a year against only a few weeks for previous screens.

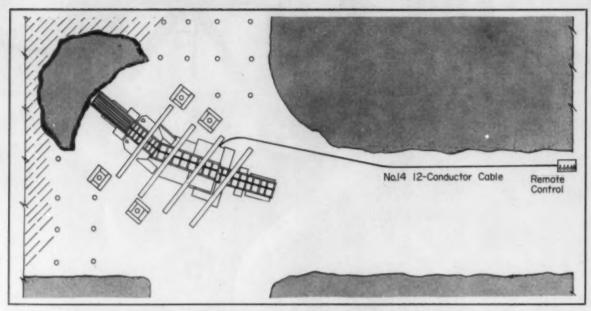


5 times the life from USS "T-1" Steel. This 18-cu.-yd. shovel bucket has lips and teeth made of mild steel lasted about 80 hours. Another alloy lasted 160 hours. Now, with "T-1" Steel, they get a whopping 400 hours minimum. USS "T-1" Steel's outstanding resistance to impact abrasion made the difference and resulted in large savings. The teeth cost about \$100 apiece. Now most of this is saved by the drastic cut in maintenance costs.

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**United States Steel** 





TYPICAL CONDITION where remote control for continuous miner proves its worth is in recovering last stump of pillar. If roof suddenly becomes unsafe, operator trams miner from position 50 ft back from face.

### Remote Control for Continuous Miner

- Why the control
   was developed
- · How it works
- · What the benefits are

By W. G. Kegel General Master Mechanic Vesta-Shannopin Coal Div. Jones & Laughlin Steel Corp. California, Pa.

WE in the Coal Division of Jones & Laughlin Steel Corp. feel that we took an early step, however small, into the new field of automated mining. The remote-control device we use is too simple to be closely associated with true automated mining. But at the time of its development very little was being done openly in either remote control or automatic operation of deep-mine equipment.

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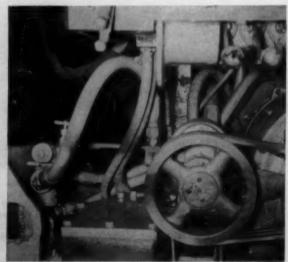
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STORAGE POSITION for remote control is on top of miner.

Cable is stored in a loop in covered light-gage steel box.



RELIEF VALVE with vent, installed ahead of main relief valve, makes possible automatic centering of head.



REMOTE CONTROL duplicates, physically and electrically, original controls.



GLAND BLOCK, welded onto the cover of the machine's master switch, makes possible the addition of remote-control unit at minimum cost.

### **Boosts Safety in Pillar Extraction**

The system was developed with the intention of providing a safer means for retraction of a continuous miner from an impending-roof-fall area. It includes a remote-control tram unit and a programmed swing arrangement. These terms sound ambitious, but they do apply to the remote control.



CAM for operating relief valve is mounted on rotating turntable top.

### Remote Control and Programming

Remote control is, as it implies, control from a point removed from the equipment, either by manual or automatic means. Programming is the performing of certain related functions in proper order by manual or automatic initiation of the first function only. The machine thus equipped, was the Joy 3 JCM miner, which we are using in retreat work in a block system. The Joy Mfg. Co. has used an electric tram system on this machine and it lends itself very readily to remote control.

Since 1952 we have equipped 18 machines with the device and definite benefits have been realized. Pillar work in the Pittsburgh seam has always created problems and the chief among them was mining the last lift of the block. This block has been referred to sometimes as the "suicide corner" by our people. An impending fall usually gives ample warning, but occasionally the operator of the miner remained with the machine longer than we considered safe. His intention was to bring the machine to safety if at all possible.

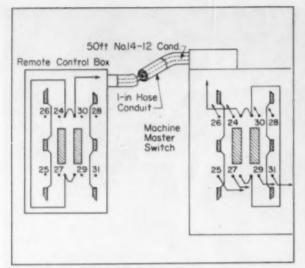
Falls on a machine are quite ex-

pensive. On one occasion we had a two-month-old machine damaged enough to require removal to the central shop for installation of a new turntable bearing. This job involved considerable expense in time, material and loss of production. As a result, the idea was born that some sort of remote control device would be necessary, particularly for reasons of personnel safety. As mentioned before, remote control of the tram circuit of the 3 JCM is easy to arrange. Permissibility was the only factor requiring careful design.

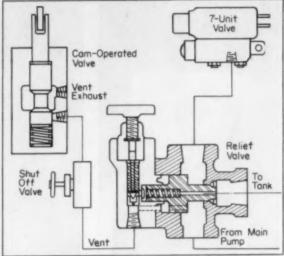
#### The Control Box

The tramming controls were duplicated, physically and electrically, and wired in parallel with the original circuit. The physical duplication was felt necessary to make remote operation as much as possible like control at the machine. This duplication should reduce the possibility of confusion at a time when every move counts.

The first control boxes were fabricated from steel, as they were made in our shops. All permissible specifications were strictly followed, the only possible objection was the



includes relief valve, shutoff valve and cam-operated vent valve.



studs in main control. Hose conduit protects cable.

weight of the steel unit. We realized that ultimately an aluminum casting would be desired, but deto this to manufacturer.

Fifty feet of No. 14 12-conductor cable is used. Nine of these wires are used for paralleling the tram circuit and the other three serve as ground wires between the machine and the remote control box. The full length of the cable is covered with 1-in hose conduit to give it maximum protection. The box has a bale or handle which permits the operator to hang it on a beam or post.

A gland block was welded onto the cover of the machine's master switch. This unit is machined to take a Joy packing gland. By putting the block on the cover, the addition of a remote-control unit can be made at minimum cost. It is necessary to buy or make one new cover with a gland installed. This cover can be used on the first changeover and the one removed can be prepared for the next job. The cover is only a flat plate, machined to fit and drilled for bolting to the main control station.

#### **Electrical Connections**

All electrical connections are easily made on the existing studs in the main control station. Since they are only an addition no changes are necessary. Although we use 50 ft of cable between the machine and remote station, almost any practical length could be used since only control-circuit current passes through the cable. The hose-encased cable is clamped and chained at both ends to protect against accidental pulling from the glands.

When not in use, the control box rests on top of the miner. A springloaded latch holds the operating levers so they cannot be accidentally moved. The box, which is nowlisted in a 5BM by Joy Mfg. Co., can have any part replaced by number.

The cable is stored in a loop in a light-gage steel box with a cover. The addition of the unit adds about 2 in to the height of the continuous miner.

#### The Programmer

While the remote control was still in the discussion stages, some thought was given to the possibility that at the moment of desired recovery the continuous miner may have its head swung hard to one side and thus be cumbersome to tram back. The additional width would certainly complicate the proposed recovery.

Since all other controls on the machine are hydraulically actuated, it would be difficult to bring any of these out to the remote-control box. We therefore decided to add a program scheme to center the head

when necessary. We believed that if the machine was swung to center. little or no trouble should be encountered when tramming from the remote position.

Swinging of the head is done with a spring-centered valve, the fifth section of the seven-unit valve on the 3 JCM. Removal of these centering springs did not hinder the operation and gave us the initiating function we needed for a simple programmed circuit.

The original main relief valve on the 3 JCM appears at the inby end of the seven-unit control valve. By going ahead of this relief and adding a Vickers relief valve with a vent port, we were able to relieve the system and stop all hydraulic operations when the head was centered during recovery procedure. Venting and consequent relief of the system is done by a cam-operated valve installed on the turntable bottom. The cam for operating this valve is mounted on the rotating turntable top and is set to operate the valve when the head is centered. This action is further supervised by a manual shutoff valve in the vent line.

The valve is normally left closed, making the vent circuit inoperative. When use of the system is felt necessary, the shutoff valve can be opened. It will not affect machine operation except during a center shear. During this center shear the valve must be closed. If trouble oc-

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curs when the machine is in this position, use of the automatic centering system is not necessary anyway. Thus this feature does not detract from the operation.

#### Using the Control

To set up a condition and follow the procedure through, let us suppose the machine is working on the last lift and the head is swung hard to the right or toward the operator. The operator has placed the remotecontrol box back under safe roof and will now proceed to mine the pillar lift.

While working with the head swung to the right, it can be assumed that the operator has opened the vent shutoff valve. If the roof suddenly becomes unsafe he can push the swing valve downward, which will start the head swinging toward the center. The operator then retreats to the safe location at the remote-control box and trams the machine toward him. The head will swing to the center, at which point the cam valve opens, vents the relief valve and stops all hydraulic operations. Even if the ripper bar is on the bottom when the operator leaves the machine, the head will usually swing to center as the machine trams toward the operator at the remote position.

Certainly the remote tramming ability is by far the more important operation for this system. The centering scheme is secondary and not always necessary, but we have installed it on all of our 3 JCM miners at J&L mines.

The system has had occasion to prove itself and has done so. From a safety standpoint alone this remote tramming control is well worth the investment.

The Joy Mfg. Co. has aided our program by having a cast aluminum control box designed and by making available the remote tramming controls, including the master-switch cover with packing gland. They had the equipment approved by the Bureau of Mines and it now can be purchased as a permissible addition to the machine.

Regardless of the simplicity of the remote-control device, we feel it constitutes an early step, and possibly a big one, in the direction of safety measures necessary in modern mining.

## PERFORMANCE-PROVED FOR 50 YEARS



#### American Rolling Ring Coal Crusher

In 1908 American Pulverizer patented the rolling ring principle of coal reduction. Today there are thousands of American Coal Crushers in operation ranging in size from Sample Crushers to Crushers having a capacity of 800 tons per hour.

American manufactures reduction equipment exclusively, backed by a half century of experience in the production of coal reduction equipment. Although improvements have been consistently made in American Crushers, the rolling ring principle still remains the most efficient method of coal reduction. This fact is performance-proved by hundreds of "cost of operations" reports from customers of American Rolling Ring Coal Crushers. May we have our engineers analyze your reduction problem?

Complete Literature Available. State your tonnage requirements.

"When you figure costs — the best results come from American Rolling Ring Coal Crushers."

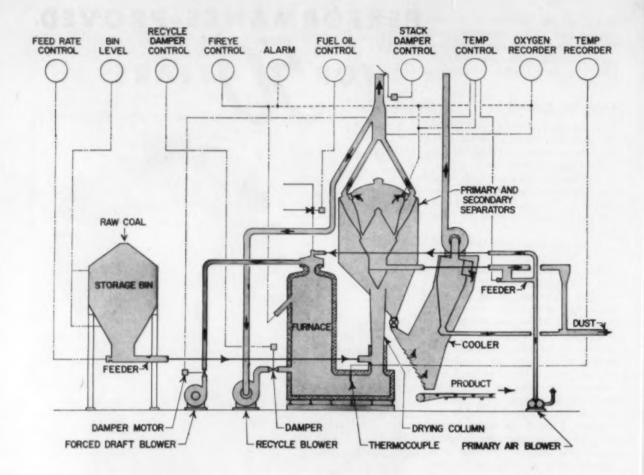


#### PULVERIZER COMPANY

OF RING CRUSHERS AND PULVERIZERS

SAINT LOUIS 10, MO.

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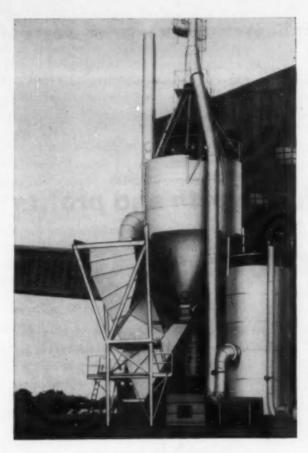


## Entrainment Dryer at Orient 3 Cuts 10M Moisture Economically

#### Orient No. 3 Dryer Performance

	Drye	Feed		Dryer I	Product	
Mesh Size	mulaive %	Each Size, tph		Cumulative %	Each Size, tph	
4	0	0		0	0	
	9.25	18.52		6.73	12.93	
8	21.98	25.48		19.21	24.00	
10	32.77	21.60		33.38	27.25	
14	50.49	35.47		47.95	28.00	
20	62.05	23.14		60.41	23.95	
28	71.02	17.96		70.22	18.84	
35	78.46	14.90		78.02	15.00	
48	83.81	10.72		83.51	10.54	
			167.79			160.51
65	87.68	7.75		87.65	7.96	
100		6.38		90.91	6.27	
150	92.81	3.88		92.69	3.42	
200	94.17	2.52		93.75	2.04	
Pan		11.68	32.21	100.00	12.00	31.69
		200.00			192.2	10-
Total Moist	ure	12.4%			9.5%	

Installed to cut moisture 2.5 points new entrainment unit has been providing a reduction of 2.9 in handling minus 10M coal at rates of 180 to 230 tph. Coal dust is used as fuel.



INSTALLED TO PROVIDE a moisture reduction of 2.5% a new entrainment-type dryer at the Orient No. 3 mine of the Freeman Coal Mining Corp., Waltonville, Ill., has been removing an average of 2.9% in the early months of its operation on minus 10-mesh coal.

Capacity of the unit—a Parry machine provided by the Silver Engineering Works, Inc.—is 200 tph. It went into service early in 1958 and initial operation revealed more degradation than had been expected. In addition water vapor given off by the dried, warm coal condensed in the surge bins ahead of the air tables employed at the plant and caused plugging.

Revisions were immediately initiated by the manufacturers and included the addition of a deduster-cooler. The dryer was re-started with a minimum of difficulties and has operated continuously two shifts a day since mid-November, 1958.

The dryer handles all the minus 10-mesh coal made in sizing and treating the mine-run. The feed rate varies from 180 to 230 tph. Average moisture removal in the first 2 mo of operation (30 samples) was 2.9%. The design rate was 2.5%. The low degree of degradation is shown in the analysis of feed and product (average of about 30 samples) in the accompanying table. Total moisture is reduced from 12.4 average to 9.5%.

In addition to drying ability, evidenced among other things by the fact that the furnace heat release has exceeded the design rate of 30,000,000 Btu per hr by 20% at high throughputs, the principal advantages cited for the Parry dryer by the manufacturer are: 1. No danger of an explosion because the atmosphere throughout the dryer is inert.

2. Rapid starting and stopping.

High thermal efficiency as shown by the 180 F stack temperature and the use of recycle gases rather than atmospheric air for tempering.

The dryer is shut down at lunch time and between the day and evening shifts at Orient No. 3. Start-up can be accomplished in less than 5 min because the furnace is hot and the dryer retains its inert-gas condition for nearly an hour after shutdown.

Salient features of the Parry dryer are shown in the accompanying diagram. The dryer is preheated and inerted with fuel oil prior to running coal. The oil orifice in the burner is sized to use the air from a positive displacement blower and give products of combustion containing 5% oxygen. The gases leaving the dryer are continuously sampled and the oxygen content is recorded on the control panel. After the establishment of a safe, inert atmosphere in the unit, the recycle blower is started. Then the forced-draft blower and fuel dust are started just before the feed screw is turned on.

The fuel oil used for starting also is the torch for ignition of the fine coal dust. About 5 min after the fuel dust has been started the oil is shut off completely. The forced-draft blower is regulated to maintain the 5% oxygen content within the dryer. The feed is started at 70 tph, but can be raised to 200 tph within a 5-min period.

When the feed rate has been raised to about 170 tph the operator puts the unit on automatic control. The temperature at the top of the drying column is measured by a thermocouple and recorded on an all-electric controller. This controller varies the speed of the fuel-dust screw supplying fuel to the furnace and thereby controls the top temperature of the drying column.

The minus 10-mesh coal is fed into the drying column by a specially designed feed screw. The feed rate is manually controlled from the panel. High-velocity furnace gases, tempered with recycle gases from the base of the stack, turbulently entrain all of the feed and carry it up the drying column and into the primary separator.

The intimate mixing of fine coal and hot inert gases results, in very rapid heat transfer and removal of the desired percentage of surface moisture. The dried product drops out in the primary separator, is removed by two 24-in star feeders, and is cooled and dedusted as it slides over louvers on its way to the dry-product belt. About 24,000 cfm of air is drawn through the deduster-cooler by the blower mounted on this unit.

The gases from the drying column expand into the large primary separator where the low upward velocity allows 98%+ of the feed to drop out as product. The gases then pass through twelve high-efficiency cyclones for stack cleanup. The fine coal dust collected by these cyclones falls into the dust hopper. A 12-in screw removes this dust and supplies the full requirement for the 6-in dust screw for fuel to the furnace. Excess dust above that required by the furnace is blended with the dust from the deduster and returned to the plant.

### **Plan** '59

## To modernize now for growth and profits Goes Into High Gear

In 1959, industry will spend more money than ever before to modernize its plant and equipment. But it is not spending enough to do the job that needs to be done.

Manufacturing companies\* now plan to spend a total of \$24.5 billion on modernization in the four years 1959-1962. This will be enough to replace roughly 70% of the obsolete facilities that were on hand at the beginning of 1959. But it will still leave us far short of our goal. It would take several years, at a higher rate of investment than is now planned, to wipe out obsolescence and give the U. S. a truly modern industrial plant.

These facts stand out from the 12th annual Survey of Business' Plans for New Plants and Equipment just completed by the McGraw-Hill Department of Economics. This new survey shows that industry has made a remarkable start on the modernization job that a previous editorial in this series described as "the most expensive task to be performed in America in this new year of 1959." The full cost of modernization has been found by the McGraw-Hill Department of Economics to be \$33.3 billion for manufacturing, and \$95 billion for all business.

For the past several months, McGraw-Hill publications have been devoting special attention to new developments in plant and equipment that offer opportunities for modernization. Our special effort to help industry in this regard has been called "Plan '59": to modernize now for growth and profits. This editorial will summarize the progress made so far with "Plan '59" and point out some of the areas where business and public policies can do still more to accelerate the modernization drive.

#### A Good Start

Business investment in new plant and equipment has picked up sharply since the low point of the 1958 recession. Plans for 1959 now show a 7% increase over 1958 for total capital investment. And the increase in expenditures for modernization is much sharper. Moreover, companies already have substantial plans for the years after 1959. New orders for industrial machinery, which are a good index of modernization plans, also are running well ahead of last year.

For the four-year period 1959-1962, manufacturing companies expect, on the average, to devote 65% of their plant and equipment outlays to modernization. This is the highest proportion reported in a McGraw-Hill survey since 1950. In dollar terms, manufacturing companies plan to spend \$24.5 billion on modernization during the next four years.

This is an impressive figure, but it does not look so large when compared with the total need

<sup>\*</sup>Excluding petroleum refining, which is reported as part of the oil industry in the data discussed in this editorial.

for modernization in manufacturing industries. As noted above, a previous McGraw-Hill study (conducted in August 1958) found that it would cost almost \$35 billion to replace all the facilities that manufacturing companies then considered obsolete. Thus, present plans for modernization are enough to wipe out only 70% of the backlog of obsolete facilities by 1962—and this makes no allowance for the additional facilities that will be made obsolete by new machines and new processes introduced during the next four years. When these new developments are considered, present plans for spending may represent only half the job that will actually need to be done.

#### **How To Accelerate**

What can be done to accelerate the drive to modernize our industrial plant and equipment? Two of the greatest aids would be:

- Improve present provisions under the tax law for depreciation, to help industry retain more of the money it needs to carry out this massive job of modernization;
- (2) Contain inflation, to preserve the purchasing power of the money industry sets aside to replace obsolete facilities.

At first glance, the supply of funds from depreciation allowances appears to be more than adequate. For manufacturing as a whole, depreciation allowances—the primary source of cash for modernization—will total \$8.3 billion in 1959, compared with present modernization plans of \$6.4 billion. Thus some extra funds will be available to support a further step-up in modernization in 1960.

Unfortunately, however, these depreciation funds are not evenly distributed from industry to industry, or from company to company. For example, in several of the metalworking industries, the prospective flow of cash from depreciation during the next four years is much less adequate than for manufacturing as a whole. These are industries with relatively large modernization backlogs, and they also are industries made up mostly of small or medium-size companies that have difficulty tapping the public money market.

As a result of these industry and company differences, there are many individual cases where shortages of funds limit the amounts of modernization now planned. In the McGraw-Hill survey, nearly half of all companies participating said that they would spend more on new plants and equipment if the depreciation allowances permitted by the tax law were increased substantially over the next few years. Most of these were relatively small companies. Their answers suggest that revision of the tax rules on depreciation should receive the most careful consideration as a spur to faster modernization.

The problem is complicated also by the threat of further increases in the national price level, which would necessarily include prices of capital goods. If "creeping inflation" resumes its march during the next four years, depreciation allowances based on present costs will be much less adequate for future needs. This points up the importance of national economic policies to maintain price stability. Unless this can be maintained, industry's dollars will not go far enough to do the modernization job that is needed.

#### Plan '59 Carries On

Industry's drive to modernize is now well underway. It can make a key contribution to our national strength and prosperity in 1959 and the years ahead. But the biggest part of this job is before us. It is up to the policy makers—in both business and government—to see that the job is done.

This message was prepared by the McGraw-Hill Department of Economics as part of our company-wide effort to report on opportunities for modernization in industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald CMcGraw

McGRAW-HILL PUBLISHING COMPANY, INC.

### Technical Program: 15th Annual Meeting Open Pit Mining Association, Electrical Division

9:45 AM Ammonium Nitrate Explosives for Open-Pit Blasting Prof. Robert F. Bruzewski, Associate Professor of Mining Engineering, Missouri School of Mines & Metal-

10:30 AM Application of Magnetic Amplifiers To **Electric Shovels** A. M. Vance, Industry Engineer, Westinghouse Electric Corp.

R. W. Bergmann, Electrical Engineer, Marion Power Shovel Co.

11:15 AM Application of T-1 Steel Morton Sundnes, Engineer of Large Stripping Shovels and Draglines, Bucyrus-

1:45 PM Maintenance of High-Voltage Trailing Cables in Open-Pit Mines by DC Testing and Fault Location

Charles E. Crawford, Electrical Engineer, Midland Electric Coal Corp. Roy A. Nelson, District Engineer, Simplex Wire & Cable Co.

2:30 PM Forum of Useful Ideas: Shovel Parts Catalog R. G. Rettig, General Electric Co., Storage of Electrical Parts and Spares E. T. Groat, General Electric Co.

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## **Open Pit Association Holds** 15th Annual Meeting

Maintenance of high-voltage cables, storage of electrical equipment, and use of magnetic amplifiers and T-1 steel discussed at one-day meeting.

MORE THAN 160 electrical engineers, chief electricians and manufacturer's representatives-plus 46 wives-assembled at the University of Missouri, Rolla, Mo., to participate in the Association's Electrical Div. meeting. Edwin R. Phelps, vice president operations, Pittsburg & Midway Coal Mining Co., served as master of ceremonies.

Officers for the coming year were elected as follows:

President-Vernon Hendrickson, electrical engineer, Pittsburg & Midway Coal Mining Co.

Vice President-Elmer Davis, chief electrician and master mechanic, Stonefort Corp.

Secretary-Treasurer-L. E. Briscoe, electrical engineer, Ayrshire Collieries, reelected.

Following are abstracts of the papers:

Ammonium Nitrate Explosives for Open-Pit Blasting-Better use of ammonium nitrate can reduce blasting costs in open-pit mining as much as 20% over normal explosive methods. This is the conclusion reached after 2 yr of research conducted at the Missouri School of Mines. The program is sponsored by the Monsanto Chemical Co.

Tests are designed to (1) study the explosive performance of ammonium nitrate, (2) verify field reports and (3) learn the most effective use of ammonium nitrate.

Data collected over the 2-yr period show that more work can be obtained from ammonium nitrate by observing the following:

1. Use oldest ammonium nitrate first. 2. Use 5 to 6% ofl with ammonium

3. Keep blasthole diameters to plus 4 in. 4. Use smaller particles of ammonium

5. Use coated ammonium nitrate.

6. Keep holes dry.

Tests are still being conducted to further improve the effectiveness of ammonium nitrate.

Application of Magnetic Amplifiers to Electric Shovels-Information regarding the theory and operation of magnetic amplifiers is needed to understand their application for the control of shovels and draglines.

able reactor with two separate windings on a common iron core and is similar

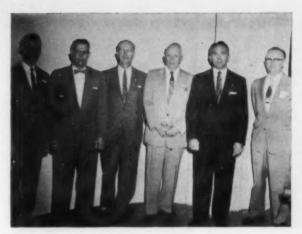
A magnetic amplifier is a simple satur-

INDUSTRY MEETING A Special COAL AGE Staff-Written Report to an ordinary transformer. Unlike the transformer, however, a saturable reactor has only one AC winding. The second winding is a control winding and is excited by DC.

The single AC winding is connected in series with a suitable AC power source and the load. By proper excitation of the DC winding, the reactor can be made to act much the same as an ordinary flow regulated valve in a water pipe. Depending upon the degree of magnetic saturation of the iron, as determined by the DC control winding, power from the AC source can be allowed to flow freely to the load or be restricted as the flow of water is controlled by the position of the valve: i.e., the more the valve is opened the greater the flow of water, or the more DC signal available the greater the power flow to the load.

The modern magnetic amplifier consists of saturable reactors, rectifiers and resistors together with several DC windings on the iron core in circuit arrangements to produce in the amplifier the condition of self-saturation. This development, in which the load current aids in saturating the iron core, has greatly increased the amplification factor of the amplifier.

Most magnetic amplifiers operate on the principle of preloading or prefilling the AC magnetic path with flux from the DC control winding. The core then saturates more easily and thus absorbs less energy from the AC supply, leaving more energy to be supplied to the load. Using a DC winding with many turns to presaturate the magnetic path re-





AMMONIUM NITRATE, MAGNETIC AMPLIFIERS, T-1 STEEL, HIGH-VOLTAGE TRAILING CABLES, PARTS CATA-LOG, STORAGE OF ELECTRICAL EQUIPMENT-R. W. Bergmann (left), Marion Power Shovel Co.; A. M. Vance, Westinghouse Electric Corp.; Prof. V. A. C. Gevecker, Missouri School of Mines & Metallurgy; Morton Sundnes, Bucyrus-Erie Co.; Edwin R. Phelps, Pittsburg & Midway Coal Mining Co.; and Prof. Robert F. Bruzewski, Missouri School of Mines & Metallurgy. R. G. Rettig (right photo) and E. T. Groat, General Electric Co.; Charles E. Crawford, Midland Electric Corp., Roy A. Nelson, Simple Wire & Cable Co.

quires a small amount of DC power to control a large amount of load power, resulting in large amplification.

Applications of Magnetic Amplifiers to Excavators-Magnetic amplifiers have a definite place in the control systems of shovels and draglines. They are very rugged, require practically no maintenance and have a very long life. They can do many things that previously required contactors and rotating exciters.

The first machine designed specifically for magnetic-amplifier control was placed in operation in 1956. This was a 60-cu yd shovel which had operating speeds much higher than any previous machines. High speeds generally mean higher shock loads with attendant tendency toward commutator flashovers. Therefore, it was necessary to use very-strong fastacting current-limiting amplifiers. Magnetic amplifiers provided stronger current limit and also made it possible to use a strong voltage regulator to obtain high rates of acceleration.

Amplifiers also can be used to energize the generator field instead of using rotating exciters. In this case, two amplifiers must be used, along with a special generator-field and bias circuit.

Application of T-1 Steel, by Morton Sundnes, engineer of large stripping shovels and draglines, Bucyrus-Erie Co.

The development of T-1 steel has enabled manufacturers of shovels and draglines to design and build higher capacity excavators at a large reduction in the over-all weight ratio compared to weight requirements of older models.

Before a new steel can be used for this type of construction it must contain:

1. High strength.

2. Good fatigue value.

3. Shock absorbing qualities.

4. Anticorrosion qualities.

The steel also must be adaptable to manufacturing processes and be available in cast forms.

Three types of steel are available for this purpose: (1) carbon or A7, (2) Tri-10 and (3) T-1. Of these three T-1 is 2.6 times stronger than A7 and 1.8 times stronger than Tri-10. In addition, the endurance limit of T-1 is 50,000 lb per square inch, compared to 42,000 for Tri-10 and 28,000 for A7.

T-1 steel costs approximately 18c per pound; Tri-10, 71/2c and A7, 5c. The additional cost of T-1 steel, in many applications, is offset by its outstanding qualities. Final selection must, however, be considered from an economical standpoint as well as from an engineering point-of-view.

Maintenance of High-Voltage Trailing Cables in Open Pit Mines by DC Testing and Fault Location-Good cable design, and proper application and handling are big factors in reducing equipment downtime, thus lowering over-all operating costs. Maintenance with DC testing is recommended because of the economical, safe and mobile equipment that can be used.

This method has the ability to search out and locate defects in the insulation without destroying the cable. Precision testing and locating faults by the condenser discharge method have been proven to be practical in open-pit

Starting with a new 5-kv SHD shovel cable, the mechanical damage failure rate averages one per 18 mo. After a cable has been damaged and spliced, the failure rate increases. Each splice

can be expected to cause trouble in about 8 mo. The frequency of cable outages varies with the number of splices or repairs. Records show that approximately 20 to 30 failures occur during the life of a cable in the pit, or 21/2 to 31/4 outages per year. This is based on over 10,000 ft of 5-kv 3conductor No. 2/0 SHD cable for stripping units, and 8,000 ft of 5-kv 3conductor No. 4 SHD loader cable. The average length of cable is 1,000 ft and the life expectancy is approximately 8 yr for trailing cables in the pit. After 8 yr the cable is used as a highwall cable where the service is less severe. These cables may last another 8 to 12 yr at this location.

DC tests can be made to locate electrical weaknesses in insulation not visible to the eye, A minimum of 7,500 V for old cables to 20,000 V maximum for new cables is recommended for testing 5-kv SHD cables. The average test voltage is 12,000 V DC for 5 min.

Overvoltage DC testing is nondestructive if the measurement of leakage current is used as a sensitive indicator of an incipient fault. If the test voltage is too low marginal faults may be overlooked. If the potential is too high the life of the insulation may be decreased.

The principle of fault location is based on picking up the audible discharge sent forth by the condenser and air gap at the fault. A high DC voltage is used to charge a condenser with the ground connected to the cable ground wires, adjacent conductors and shield. When the condenser is charged to a certain value, it will flash across the air gap, which is adjusted accordingly, thus locating the fault.

Shovel Parts Catalog-This parts cata-

## How to "specify" splices that will last as long as the cable

You can specify "failproof" splices by specifying the same kind of insulation for the splice that you do for the cable.

The compound used for insulating a cable is specifically designed for its job. Therefore, when a portion of the insulation is removed in making the splice, it stands to reason that the insulation should be replaced with the same material—with a true cable-insulating compound.

Fortunately there are splice insulating tapes made of true cable compounds. They're Okonite and Okolite tapes. Made from fine Para rubber, unexcelled for physical characteristics, Okonite and Okolite tapes fuse into a solid, layerless, non-porous wall of insulation that has excellent moisture resistance, no voids to cause failure, and no adhesives to dry out, ooze, or cause slippage of the tape wrappings. Okonite and Okolite actually become an integral part of the cable's insulation, not a weak "link" in it.

Like to try some of this tape? Let Okonite pay for your first roll. Ask for either or both of the tapes. Just fill in this coupon and send it to Okonite.

#### THE OKONITE COMPANY

Subsidiary of Konnecott Copper Corporation Passaic, New Jersey

Dept. CA-8	
The Okonite Company Passaic, New Jersey	
Please check one or both.	
Okonite tape (yellow can-for use to 2000 volts).	nj
Okolite tape (red can-far use up 35,000 volts).	91
Name	20
Title	
Company	
Address	
City Zone State	15

log was prepared by the Open Pit Mining Association and the General Electric Co.'s service shops department. The information contained in this catalog may, in times of electrical emergency breakdowns, assist a company in obtaining the necessary equipment to repair its machine.

It was prepared for the purpose of informing participating members where electrical spare parts are available and whom to contact in order to obtain the parts. Although this directory will indicate where spares are located, prior use may make these unavailable at any specific time.

Arrangement for obtaining a spare part must be made on an individual basis.

For ready reference, machines are grouped according to type, regardless of manufacturer. In each group the machines are listed numerically by serial number. Only the large revolving electrical apparatus and spares are listed, but if other parts are required, the directory will serve as a guide to show who is most likely to have the required parts.

Storage of Electrical Parts and Spares

-Authorities may differ as to the relative importance of electrical storage
problems but all agree that three factors
must be considered in providing ideal
storage conditions. These factors are:

1. Temperature—This can be taken care of quickly by stating that temperatures generally comfortable to humans are satisfactory for electrical equipment. This implies heating in the winter but it does not necessarily follow that cooling is necessary in the summer.

2. Cleanliness—This is a health factor important to electrical spares as well as to personnel. Quoting one authority: "A common enemy of mechanical and electrical parts is dirt, and every effort should be made to keep parts clean. It is easier to prevent contamination than to remove it." Another precaution under this heading is the necessity of excluding all shop dirt, fumes and oil vapors. This eliminates areas next to garages and shops as desirable for a storage room unless the room is completely sealed.

3. Relative Humidity—Authorities differ as to the "ideal" relative humidity in a storage area. However, 40 to 60% is proper and adequate for storage of electrical spares. This range is considered ideal for commutators and will certainly be satisfactory for other parts.

The following seven steps are recommended for setting up a proper storage room:

 Classify all spares and parts into groups. Include in the "must" group all electrically insulated motors, generators and armatures, and rotors, stators and coils. It would be wise to include



L. E. BRISCOE, elected to the office of secretary-treasurer for the third time, was presented a stereophonic tape recorder by members of the Open Pit Mining Association for his outstanding contributions and untiring devotion to the association.

in this classification any valuable packaged parts, such as, ball bearings which must be kept clean. Certainly bolts, nuts large gears, oil and grease drums, electric lamps, etc., do not qualify.

2. Make a storeroom layout providing monorail chain and block with access to all heavy parts and exit to a truck-body-level loading platform. Layout should include suitable covered racks or cabinets for the smaller parts.

Provide sufficient space for good arrangement and housekeeping in an area that will supply clean, fresh air when doors must be opened.

4. Provide adequate heating—steam or electric—to maintain temperature in the "generally-comfortable" range, say 60 F minimum up to summer room temperature.

5. Install adequate dehumidifying equipment. This can be accomplished by the installation of self-contained electrically-driven dehumidifiers with provisions to drain off condensed water, or by other contrivance, such as a small fan blowing air over cold-water copper coils. Incidentally, proper humidity control will require added moisture during the winter heating season.

6. Make the room as airtight as possible and insulate against outside cold and heat. Doors should be kept to a minimum and windows excluded altogether. Doors should be self-closing. To provide maximum protection it may even be feasible to provide double airlock doors.

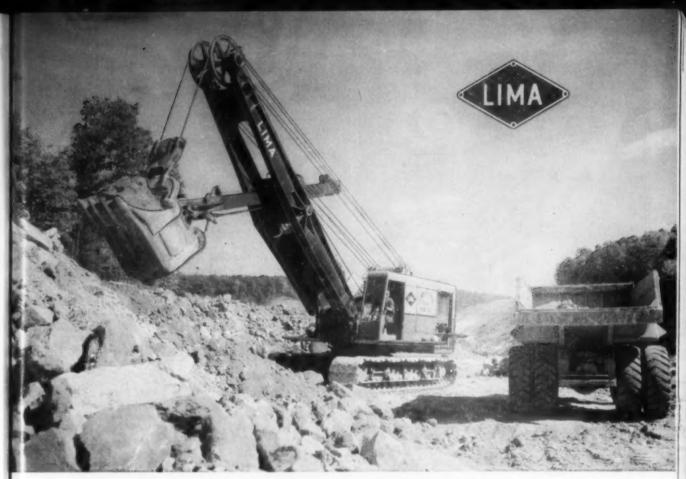
7. Having provided the facility, post easily understood instructions concerning the care and use of the storeroom. Good housekeeping is essential and frequent use of a vacuum cleaner is recommended. If a fresh air source is provided it should be equipped with filters.

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Lima 1250 3½-yd. Shovel nears end of million-and-a-quarter-yd. excavating job on highway reconstruction project near Knapp, Wis,

## "LIMA 1250 moves half million yards of rock-at 270-300 yards hourly!"

says Lawrence Gerke, Wisconsin contractor

The job was tough, the schedule tight. "In only 2 miles," says contractor Lawrence Gerke, of Merrill, Wis., "we had to excavate a million and a quarter yd. . . . almost half of it

#### High performance, low maintenance

The project involved reconstruction on U. S. Interstate 94 near Knapp, Wis. Gerke needed a high performance machine with low maintenance requirements. He says, ". . . After considerable analysis of equipment, we purchased a Lima Type 1250 for rock excavating. In many cases no

blasting was done. Yet, working in this material, the Lima constantly averaged 270 to 300 yd. per hour. When shovel work was completed, the 1250 was easily converted in the field to a dragline.

The crawler-mounted Type 1250 has turned in outstanding performances everywhere as a 3½-yd. shovel, 85ton crane, and variable dragline.

#### Air-controlled precision

Main operating and auxiliary functions are air-controlled for smooth, precision performance at full capacity operation. Choice of diesel engine or electric motor with torque converter. Other features and available equip-ment include: Independent propel, extra-high-speed hoist attachment, third drum, power reversing hoist drum, two types of rigid and folding gantries. The 1250 can be knocked down to units of less than 60,000 lb. for haulage.

Whatever your job, there's a Lima type and size exactly right—1/2 to 6-cu. yd. shovels, cranes to 110 tons. draglines variable. Learn now why so many contractors agree with Lawrence Gerke when he says, "We are completely satisfied with the opera-tion of our Lima." See your nearby Lima distributor or write to us.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA Construction Equipment Division, Lima, Ohio

BALDWIN · LIMA · HAMILTON

Shovels . Cranes . Draglines . Pullshovels . Roadpackers . Crushing, Screening and Washing Equipment





MIIA OFFICERS-Frank T. Powers (left), treasurer; Arthur Bradbury, president; G. J. Steinheiser, first vice president; R. D. Bradford, second vice president; Joe Mulligan, assistant secretary; Stanley Mooney, editor-in-chief; C. A. McDowell, secretary-emeritus; Charles A. Purcell, third vice president. W. J. Schuster, publicity editor was not present for the photo.

Roof support, ventilation, safety, mine rescue and fire protection major topics as . . .

## Mine Inspector's Institute Meets

ACCIDENT PREVENTION PROGRAMS, advances in roof support, ventilation problems with continuous miners in three states, handling of ammonium nitrate, rescue techniques and fire protection highlighted the 49th annual convention of the Mine Inspector's Institute of America at Terre Haute, Ind., June 22-24. Over 340 members and guests from 18 states, District of Columbia and Canada attended the annual meeting.

In the institute business sessions, members accepted an invitation from the state of Kentucky to hold the 50th annual convention in Lexington or Louisville in 1980. Officers for 1959-60 were elected as follows:

President, Arthur Bradbury, assistant manager of coal properties, Inland Steel Co.

First Vice President, G. J. Steinheiser, mine inspector, Pennsylvania Dept. of Mines and Mineral Industries, Union-town, Pa.

Second Vice President, Robert D. Bradford, supervisor, USBM, McAlester, Okla.

Third Vice President, Charles A. Purcell, director, Indiana Bureau of Mines and Mining, Terre Haute, Ind.

Secretary, Joseph Bierer, Mt. Storm, W. Va.

Secretary-Emeritus, C. A. McDowell, California, Pa.

Assistant Secretary, Joe Mulligan, safety inspector, Semet-Solvay Div., Montana, W. Va.

Treasurer, Frank T. Powers, director, Maryland Bureau of Mines, Frostburg, Md.

Editor-in-chief, Stanley Mooney, safety director, Woodward Iron Co., Woodward, Ala.

Publicity Editor, W. J. Schuster, St. Clairsville, Ohio.

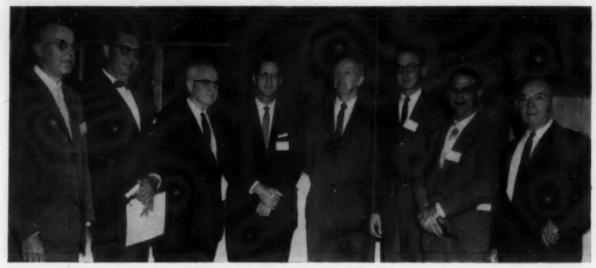
Successful Accident Prevention Programs for Bituminous Coal Mines, George W. McCaa, general manager, Ireland mine, Hanna Coal Co., Moundsville, W. Va.

Transition to mechanical and continuous mining has greatly increased the value of section foremen in developing a successful accident-prevention program.

A successful program needs foremen that have more than the basic knowledge required to obtain state certificates. They must have, among other things, the following qualities:



VENTILATION, FIRE PROTECTION—R. W. Stahl (left), Bureau of Mines; C. H. Patterson, Rochester & Pittsburgh Coal Co.; J. A. Boyle, United States Steel Corp.; George G. Guiney, Illinois Dept. of Mines and Minerals; Robert D. Bradford, session chairman.



ROOF SUPPORT, MINE RESCUE, AMMONIUM NITRATE—E. Lewis (left), Ohio Coal Association; R. J. Jones, Olin Mathieson Chemical Corp.; Crawford L. Wilson, West Virginia Dept. of Mines; F. D. Baker, Bureau of Mines; Ronald Beaton, Dept. of Mines, Canada; R. L. Vines, Kentucky Dept. of Mines and Minerals; T. J. Liddle, Stonega Coke & Coal Co.; and George J. Steinheiser, session chairman.

1. Pride, integrity and interest in doing a good job.

2. Able to teach and sell safe working habits.

3. Intelligence enough to carry out plans and safety rules.

4. Sufficient mining experience to enable them to make decisions.

In addition, it is necessary to consider retraining foremen in the potential hazards generally encountered in mining and the problems that develop with modern mechanized equipment. At the Ireland mine, for example, foremen went to school 8 hr a day for several weeks and were given a refresher course in mining fundamentals along with a study of the West Virginia mining laws. They also received extensive training in gas detection and in properly judging roof conditions in the Pittsburgh seam.

Accidents can be reduced by improving the performance of section foremen. Items that will aid in this improvement

Section foremen should be carefully selected.

They should be properly and thoroughly trained in the fundamentals of mine safety.

3. They should be given additional training in the specific problems encountered with new equipment. (To make this training effective, it may be necessary to take them off their regular job during the training period.)

4. They should be given assistance in planning and performing their work.

5. Improvements in safety performance of section foremen can best be obtained by having experienced company officials and inspectors spend more time at the working face to explain and show foremen better and safer ways

of performing their assigned duties.

A Plan for Safety Education of Coal Mine Employees, Charles Ferguson, director, Safety Div., UMWA, Washington, D.C.

When a union insists on incorporating safety features in a contract it must assume its share of the obligation. Safety is a joint cooperation of operators, employees and the union.

Noting that he had gone to the USBM for an accident-prevention program several years ago, Mr. Ferguson pointed out that though the program had long been available only 2,000 mining men had taken the training. Most of them had been foremen.

After finding this out the UMWA set out to get union men to take the training. This was accomplished by (1) encouraging coal companies to increase safety education through the bureau by having the program made available to workers and (2) awarding men who complete the course with a certificate signed by John L. Lewis.

Since then 280,000 men have received certificates. In every case where training was given, accidents were initially reduced. However, a back slide would occur after approximately 6 mo. It was found that training had to be increased and in some cases the program had to be repeated.

The USBM plans to offer a supplemental program which it will give to coal companies on request. The bureau will train supervisors who would then train the workers. This program, however, is still in the formative stage.

The State Mine Inspector's Responsihility, Lewis E. Evans, Deputy Secretary of Mines and Minerals Industries, Commonwealth of Pennsylvania, Harrisburg, Pa.

Prevention of accidents in coal mines is everyone's responsibility. The state mine inspector cannot do the job alone —it was never intended that he should. He can only advise and recommend.

Following are some legal and moral obligations of state mine inspectors:

 Inspect mines under his jurisdiction as often as state law requires, and oftener as conditions may warrant.

Inspect mines thoroughly and bring to the attention of mine management, mine officials and mine workers hazardous conditions.

Discuss with mine officials and mine workers the systems and methods of mining at their particular mine.

 See that unsafe conditions are promptly and adequately corrected and kept safe.

See that every means is exhausted to keep mines safe, and institute proceedings against those who defiantly and openly violate state laws.

6. Create and maintain an active interest in accident-prevention work.

7. See that there are trained first-aid and mine-rescue teams at the mines.

8. Take an active part in safety meetings.

Assist in educating and examining applicants for miner's certificates and other jobs.

 Respect his superiors and render his fullest cooperation at all times.

11. Keep physically and mentally fit.

12. Make and prepare mine inspection reports, monthly and yearly reports of the mining activity in his district, and serve on commissions as directed by the department secretary.



ACCIDENT-FREVENTION PROGRAMS—George W. McCaa (left), Hanna Coal Co.; Nat Kirk, Snow Hill Coal Corp.; Lewis E. Evans, Deputy Secretary of Mines and Mineral Industries, Commonwealth of Pennsylvania; Arthur Bradbury, session chairman; Charles Ferguson, UMWA; B. H. Schull, association president; P. M. Wadsworth, Climax Molybdenum Co.; W. H. Tomlinson, USBM.

 Realize that he has been endowed with certain talents and that he should extend these talents to their limits.

 Keep abreast of new and approved mining methods, mining equipment and education.

Bureau of Mine's Accident-Prevention Program, James Westfield, assistant director, USBM, Washington, D.C., read by W. H. Tomlinson, training administration officer, USBM.

The most effective tool to prevent accidents and injuries is accident-prevention education. The bureau has formulated and presented courses in first aid and mine rescue and recovery procedures. Persons trained in these fields receive instruction that is fundamental accident-prevention training.

Over 180,000 supervisors and workmen have completed the USBM's Bituminous Coal Miner's Safety Course. The newest course is a psychological approach to accident-prevention and will be added to the list of established training courses.

In addition to training courses, the bureau provides substantial guidance in accident prevention in many other ways.

Visual Aids—The bureau's explosives testing station and experimental coal mine provides visual tests to promote safety knowledge. Motion pictures covering common occurrences of accidents are available to classes, Holmes Safety meetings and other organized gatherings.

Permissible Equipment — The bureau tests all sorts of electrically powered mining equipment, electric cap and hand lamps, safety lamps, etc. All of this is educational and the ultimate aim is to prevent or reduce accidents and injuries.

Mine Ventilation — Recently a separate organization was set up at Pittsburgh to assist the mining industry in solving its more difficult ventilation problems including the effects of multiple-fan operation and the study of dust control with continuous-miner operations.

Coal-Mine Inspections and Investigations — In investigations of and reports on fatal injuries the aim is not only to present the facts but also to show how to prevent similar occurrences.

Successful Accident-Prevention Programs in Metals Mines — In Colorado, P. M. Wadsworth, safety director, Climax Molybdenum Co., Climax, Colorado.

The safety department consists of a safety director, assistant safety director, two permanent underground safety inspectors and two mine-shifter inspectors. A surface inspector, fire chief and assistant fire chief handle fire protection as well as inspection work in the crusher, mill and other surface departments.

The safety department considers the following items as necessary for a successful safety program at Climax.

- Education Each man receives instruction on safety rules and safe practices.
- Safety Meetings Meetings are kept interesting by changing the line of approach.
- 3. Visual Aids Posters, placards and bulletin boards are constantly changed to catch the eye of the individual and keep his mind on safety.
- Adequate Coverage Adequate inspection by safety trained personnel covers all operations frequently.
- Cooperation Cooperation of worker and management is essential.

If top management is not behind the safety program 100% it is very difficult, if not impossible, for a safety department to function efficiently.

In New Mexico — W. H. Hays, state mine inspector, Albuquerque, New Mexico (read by Nat Kirk, safety engineer, Snow Hill Coal Corp., Terre Haute, Ind.).

An intensive and continuous safety education program has been presented by the safety engineer, Homestake Mining Co., to develop positive attitudes toward safety practices in both supervisors and workers.

All new employees are given brief lectures on the following:

 General principles of local mining methods and operations.

- General safety hazards inherent on the job and means of preventing accidents.
- Proper procedure in case of accidental injury.
- 4. First-aid facilities and equipment.
- Necessary protective clothing and accessories.
  - 6. Safety equipment.
- Individual's responsibility for his cwn personal safety.
- 8. Necessity for obeying rules and orders.

The success of the program at Homestake is exemplified by its outstanding record. After 6½ mo, 75,000 man-hours, the company has not had a lost-time accident.

Transportation, Use and Storage of Prilled Ammonium Nitrate Blasting Agent, R. J. Jones, technical representative, Olin Mathieson Chemical Corp., E. Alton, Ill. — Performance of prillpende exploses sensitives develor A oil be and pring a

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oil mixtures as blasting agents is dependent on more factors than regular explosives. This is due to relative insensitivity, solubility, lower peak velocities and pressures, and rate of pressure development.

A mixture of 94% prills and 6% fuel oil by weight enhances the chemical and physical characteristics of the blasting agent. Correct application also includes proper confinement and priming of the mixture.

Priming has caused more confusion than any single aspect. The rule of thumb has been that the end results are influenced by the primer. The better the primer the better the over-all results. "Better" in this case means that the greater velocity and heat the mixture is subjected to the greater its potential. It should be remembered that the mixture has a maximum velocity and pressure and that these maximums cannot be exceeded regardless of the primer. Consequently, a primer good enough to produce these extremes is sufficient.

Just how much primer should be used is generally based on past experience or published data. Hole diameter is a definite factor here. The percentage of priming increases as the hole diameter decreases. The most prevalent priming method today is called "multiple-spot priming," i.e., primers placed at predetermined levels in the loaded column.

Commercial explosives containing at least 60% ammonia dynamite are acceptable as prill-oil primers.

It would be negligent not to recognize the safety connected with prill-oil mixtures. By itself the mixture is very insensitive to shock or friction. The one big hazard is fire. Consequently, normal fire-prevention methods will go a long way in preserving the safety record of Coal Association).

Discussion, James Hyslop, president, Hanna Coal Co., Cadiz, Ohio (read by E. Lewis, assistant commissioner, Ohio Coal Association).

Blasting with ammonium-nitrate mixtures has been, and still is, greatly handicapped by the lack of scientific data. Hanna, in recognition of this fact, has been researching ammonium-nitrate blasting for about 2½ yr. The program has been expensive but it is believed that the efficiency and safety of the company's blasting methods have been greatly enhanced by the application of principles developed through research.

With respect to impact detonation, success has been achieved in making prilled ammonium nitrate-oil mixtures which can be detonated in the open consistently with a No. 6 blasting cap and which are almost impossible to ignite by impact. Therefore, the fire hazard program mentioned by Mr. Jones would seem to be the most important one in

the handling and storage of this material.

Safety in the actual blasting operations is an important factor generally overlooked. Coated ammonium nitrate prills are so insensitive that in almost every case it is necessary to provide priming charges at frequent intervals. Otherwise the detonation will die out.

Mr. Jones states that "The better the quality of the primer the better the over-all results." This is true because coated prills are not a good or efficient explosive. This is true whether the coating is inert or active, Mr. Hyslop observed. Therefore, high-explosive primers and insensitive ammoniumnitrate mixtures have to be used together in the blasting operation. Such a practice is just as hazardous as if only high explosives were used, and in some cases the hazards are even greater. Hanna gets around this difficulty by using a blasting system that does not require high-explosive primers and by using prills with a coating of 0.4 of 1% or less, rather than the 2% to 4% normally nsed

Mr. Jones further states that "Very satisfactory results are being evidenced in all methods of ammonium nitrate use." In his judgment, said Mr. Hyslop, this is a highly erroneous statement. Rather a large part of ammonium nitrate is being used inefficiently. The idea that ammonium nitrate blasting is a simple procedure that can be safely and efficiently followed by anyone is a dangerous fallacy. "I hasten to add I also believe that ammonium-nitrate-oil blasting is the safest blasting method that has ever been devised"—when the proper procedure is followed.

Recent Advances in Roof Support in Mechanized Mining, R. L. Vines, executive assistant, Kentucky Dept. of Mines and Minerals, Lexington, Ky.

Rapidly coming into widespread use are improved hydraulic jacks as temporary face supports. These jacks are quick-acting and are practically maintenance free. A heavier yieldable-type jack also shows promise as an alternative for cribs.

Another newcomer for use with continuous miners is a canopy unit. The "walking" canopy promises to speed the rate of advance and afford continuous protection to machine and machine operator.

In the past few years much attention has been given to prescribed plans for timbering. The greatest problem lies in getting the job done exactly as planned. It is just as expensive to install bolts incorrectly as it is to install them correctly. Bolts installed incorrectly create a false sense of security, thus increasing roof-fall accidents.

The cementing of roof strata by injection of a binder substance is a relatively new method of roof control. It is

the only system which offers hope of strengthening roof in advance of the solid face.

Mountain bumps are being studied with the aim of devising corrective measures. The outcome of investigations and analysis in the field of rock mechanics may result in a better understanding of the forces acting in massive overburden when underlying strata are disturbed by mining. General rules to be followed when extracting pillars in an area subject to bumps include:

1. Complete extraction of coal and timbers.

Orion

Orientation of pillar lines with the natural fracture lines of the roof.

Avoiding formation of points on pillar line which extend into gob area.

4. Mining the pillars as fast as possible at a constant rate,

Avoiding the necessity of developing pillars close to the gob line and developing new pillars away from rather than toward stressed areas.

Mining individual pillars open-end with narrow lifts.

Keeping pillars uniform and as large as possible.

Discussion, Crawford L. Wilson, director, West Virginia Dept. of Mines, Charleston, W. Va.

The advent of continuous mining has brought about the necessity for changes in roof-support systems and in materials used for this purpose. However, conventional systems using wood supports —timbers and crossbars—continue as accepted practice in many mines. Conventional roof-support methods also have been improved.

Important experiments in connection with roof control are being conducted by the USBM. These experiments include the use of sound waves in testing roof, roof bonding and a mining shield to protect workmen and equipment at the working face.

Experiments with projected sonic waves have progressed to a point where the opaqueness and transparency of certain rock components can be defined. It is claimed that the transmission through solid-mass rock structures, as well as through masses of unjoined or loosely joined rock, has been accomplished. Reflected waves tend to show the density characteristics of the mass.

A mining shield to provide continuous protection for operator and machine at the working face has been developed by the USBM. The shield will be used in conjunction with continuous miners and with the cycled operation of loading machines. A full-scale model is now under construction for testing at the Experimental Mine at Bruceton, Pa.

Discussion, T. J. Liddle, director of safety, Stonega Coke & Coal Co., Big Stone Gap, Va. Mr. Vines emphasized the importance of proper installation and the need for making checks on roof bolt assemblies. At Stonega no major changes are made in roof bolting without first conducting a series of pull tests on both the proposed materials and the materials being used.

We have established, by standard test procedure, that a minimum yield load of 13,000 lb is desirable to effectively support the roof in Stonega mines. The bolt materials have the ability to provide the required support. The remaining problem, therefore, is getting the bolts properly installed.

Recovery Operations and Survival Techniques at the Springhill Mine Disaster, Ronald Beaton, assistant chief inspector of mines, Dept. of Mines, Springhill, Nova Scotia.

Successful accident-prevention programs for coal mines are the aim of the industry. Unfortunately mine disasters occur and it is essential to have efficient disaster organizations to cope with these situations.

The disaster organization at Springhill consists of mine managers, engineering staff, inspectors of the Dept. of Mines, mine-rescue superintendent, heads of each mine department and a crew of volunteer miners from each section of the mine.

Good radio, television and press relations are essential during the aftermath of a disaster. False rumors spread by these media can cause low morale among the town people and rescue workers, thus decreasing the efficiency of the rescue operations.

Modern Telephone System for Mine Rescue and Recovery Work, F. D. Baker, mine inspector, USBM, Pittsburgh, Pa.

The mine-rescue communication system, USBM Approval No. 9B906, consists of four basic components: microphones, loudspeakers, amplifier units that are battery powered, and a wire connecting a set or sets in the system. This system can be used by crews equipped with one or more approved full-type facepieces with speaking diaphragms. Facepieces with speaking diaphragms have been approved for use with the McCaa 2-hr breathing apparatus and also for the All-Service gas mask and Chemox apparatus.

The amplifier consists of a shutoff switch, four transistors, several condensers and two 6-V mercury dry-cell batteries. The unit is small enough to fit into a shirt or coat pocket and is encased in lightweight plastic. The speaker's voice is heard through small cone-shaped speakers—as many as 10 are permitted in the system.

The components are joined by a lightweight 2-conductor cable spooled on a reel equipped with a handle so that wire can be paid out or collected without interrupting conversation.

A team that has been trained in the use and care of breathing apparatus and in proper mine rescue and recovery procedures needs only a small amount of additional training to be able to assemble and use this communication unit.

Ventilation Problems Arising from the Advent of Continuous Miners—In Pennsylvania, J. A. Boyle, director, mine inspection, Coal Div., United States Steel Corp., Pittsburgh, Pa.

Continuous miners have increased the rate of methane liberation at the face, particularly in virgin territory. The desirability with certain types of equipment to confine operations to one or two places per shift further aggravates the situation. Equipment bulk in relation to entry size and conformation tends to interfere with proper direction of air at the working face.

Our approach to this problem has been simply to increase quantities of air, sometimes up to over 50,000 cfm per split. However, supplying vast quantities of air to working sections does not answer the problem of face ventilation. Direction of air to the face is most important. One method of directing sufficient air to the working face is the line curtain.

Experience tends to prove that return brattice ventilation is not nearly as effective in the dilution and removal of methane from the working face as the intake type of line curtain with positive pressure and relatively high velocities at the end of the curtain. This method has not been applicable to the boring type machine at U.S. Steel operations, primarily because of space limitations and machine bulk. Consequently, intake brattice installations are employed to ventilate the face area. Space in an entry developed by boring machines affords little area for line brattice. The canvas is hung as far from the rib as practicable and also is supported on the rib well above the bottom, achieving a tubular cross section.

A vertically supported self-closing door also has been developed. The door frame is made of steel and is installed with bolts. Translucent plastic is used to cover the door. Experiments with several types of plastic are under way. Results thus far are promising.

In West Virginia, C. H. Patterson, safety manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.

Some sort of auxiliary face ventilation should be provided if the area in which continuous miners are used generates methane to any extent. Auxiliary fans are not permitted except for specific purposes. However, a permit to use auxiliary fans can be granted by the Joint Industry Safety Committee. Such a permit was granted to the USBM, and auxiliary-fan tests are being conducted jointly by the USBM and Rochester & Pittsburgh.

Equipment consists of a 5-hp Aerodyne fan rated at 6,500 cfm at free flow, a Goodman 400 borer, Joy 11BU loader and two Joy 10SC shuttle cars.

The quantity of air during tests ranged from 9,000 to 13,000 cfm. Volume through the fan ranged from 1,100 to 4,400 cfm. Fan tubing was wire-reinforced rubberized fabric in sections 10 ft long and 14 in in diameter. A metal duct mounted on the miner served as an inlet to the fan tube to take air from the conveyor-well at a point 8 ft outby the immediate face.

Results of tests are as follows:

Test No. 1—Total advance during this study was 104.5 ft. The operating time was 19.4% of the total time required to drive this distance. The exposure rate—square feet of roof, ribs and floor—was 11.3 sq ft per minute. The highest methane reading was 0.42% and amounted to 6.9 cfm.

Only three readings exceeded 0.50% methane and each was associated with coal piled up at the rear of the miner. This points up the fact that the accumulation of a large pile of coal should be avoided.

Test No. 2—Total advance was 112.5 ft. Operating time averaged 48.3%, average rate of advance was 0.35 fpm. The rate at which new surfaces were exposed averaged 11.36 sq ft per minute. Maximum methane detected in the fan tube was 0.6% when air volume was 1,059 cfm.

Test No. 3-The operating time averaged 38.4% of the total time necessary for advancing 108 ft. The rate of advance averaged 0.318 lineal fpm. The rate at which new surfaces were exposed was 10.2 sq ft per minute. The maximum rate was about 64 sq ft per minute.

During this study the maximum methane concentration detected in the fan tube was 0.34% and the quantity of methane being exhausted by the fan ranged from 4.05 to 9.88 cfm.

The maximum methane detected was 0.88% and was found in the conveyor trough of the loader. At this time the face of the room was 58 ft past the inby rib of the crosscut in which the fan was installed. The fan was inducing a flow of about 2,500 cfm.

In Illinois, George G. Guiney, inspector-at-large, Illinois Dept. of Mines and Minerals.

Preliminary investigation has been conducted in Illinois mines using continuous miners. Aims were:

1. To determine the increase in methane gas at the face.

2. To ascertain if methane concentrations at the face were greater than the maximum allowable.

3. To determine the effectiveness of line brattice in ventilating the face.

The investigation showed:

 That entries were driven a distance of 80 ft into virgin coal without ventilation.

2. Where line brattice was installed, inadequate ventilation was moving between the rib and line brattice to keep methane content below the 1% limit.

3. Line brattice at times regulated the intake air to the section.

4. Line brattice was poorly installed when an inspector was not present. At times line brattice was not used.

5. Line brattice was the only method used to ventilate faces.

6. Methane was allowed to accumulate above the maximum.

The investigation has had a two-fold effect on face ventilation in Illinois:

 Ventilation is now being controlled at the face to meet mine-law requirements.

2. Investigation has proved to operating personnel that it will be necessary to maintain maximum ventilation efficiency at all times to meet the requirements of the law.

During this investigation, one of the main objections of operating personnel was that 1% methane at the face was not dangerous. The answer is that the Illinois Dept. does not intend to let it accumulate to a near-dangerous level.

Are Coal-Mine Employees and Dollars Protected from Fire as Well as Other Industrial Employees and Dollars? R. Ward Stahl, USBM, Pittsburgh, Pa.

A survey of fire protection provided in some coal mines disclosed that a rather low value appeared to be placed on expensive equipment. If mine management wishes to approach the degree of fire protection afforded other industrial plants, the following measures would not be unreasonable.

1. Provide at least one 20- or 30-lb dry-chemical extinguisher (or equivalent) and enough Self-Rescuers for the regular crew plus two or three spares.

2. Furnish enough 1½- or 2-in hose to reach the most remote face section. The hose need not be connected but be available so that no time is lost in coupling the hose to the mains.

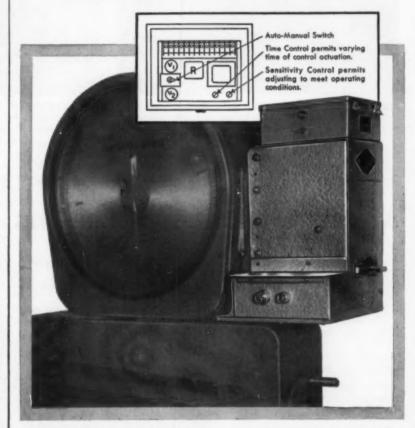
3. Give training in the use of fire extinguishers, Self-Rescuers and water facilities to each man at least quarterly.

 Make sure that each section foreman and at least one other man are familiar with the air-circulation pattern and possible escape routes.

Conduct quarterly inspection of water facilities and fire extinguishers to assure that they will function when needed.

6. Pressure test all hose at least yearly.

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MARKETING, SAFETY, STRIP-MINING-J. H. McKenna (left), Socony Mobil Oil Co.; R. T. Person, Public Service Co. of Colorado; A. Z. Dimitroff, USBM, session chairman, and L. M. Cooley, Edna Coal Co.



COAL'S STAKE—R. R. Williams Jr. (left), manager of mines, Colorado Fuel & Iron Corp.; Hon. Elmer F. Bennett, undersecretary, Dept. of the Interior, and M. J. Ankeny, director, U. S. Bureau of Mines.

Rocky Mountain CMI, in 55th annual meeting, views

## Management, Operations, Safety

Use of western coal as a source of electric power, requirements to be met in financing coal's growth, functions of Utah's Industrial Commission and progress in safety are among major themes of Colorado Springs convention.

RAPID GROWTH in population in the western states and the swift-moving technology which is general throughout industry are two factors which indicate a need for dynamic action to keep the coal industry abreast of developments. This was the view expressed by Undersecretary Elmer F. Bennett, U. S. Dept. of the Interior, Washington, D. C., at the opening of the 55th annual meeting of the Rocky Mountain Coal Mining Institute at the Antlers Hotel, Colorado Springs, Colo., Jun. 29-Jul. 1. Mr. Bennett's keynote remarks followed a short business session, in which it was reported that the institute had 39 new members among the 167 registrants.

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R. R. Williams Jr., manager of mines, Colorado Fuel & Iron Corp., Pueblo,



PERSONNEL, INDUSTRY GROWTH, OPERATIONS—Tony Fratto (left), Independent Coal & Coke Co.; Otto Wiesley, Utah Industrial Commission; John Peperakis, Kaiser Steel Corp., session chairman; J. W. Woomer, J. W. Woomer & Associates, and Earl R. Maize, USBM.

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TECHNICAL ASPECTS-R. E. Cope (left), Texaco, Inc.; Leif Arentzen, Lee-Norse Co.; R. R. Williams Jr., session chairman, and Warren Gerler, Link-Belt Co.



DUST CONTROL-A. Lee Barrett, Joy Mfg. Co., Franklin, Pa.

Colo., and president of RMCMI, opened the 3-day meeting with a commendation of coal-industry management for increasing the efficiency of mining to the extent that a stable price on coal has been maintained throughout the last decade. Furthermore, users of coal have increased their utilization efficiency, thus keeping coal competitive with other fuels at point of use, Mr. Williams noted.

At the main business session, members of the institute voted honorary life memberships to retired members Joe R. Kastler, Fred Koelling, J. B. Morrow, Gomer Reese and G. H. Smith. Officers for the coming year were elected as follows:

President-W. K. Dennison, manager, Raton Operations, Kaiser Steel Corp., Raton, N. Mex.

USBM, Denver; for New Mexico, C. M. Utah. McConnell, USGS, Carlsbad, N. Mex.; for Utah, C. C. Cornelius, general manager, United States Fuel Co., Salt Lake City, Utah; for Wyoming, G. E. Sorensen, president, Gunn-Quealy Coal Co., Frontier, Wyo.

Secretary-treasurer-Fred W. Whiteside, consulting engineer, Denver, Colo. Executive board - For Colorado, W. M. Kerr, general superintendent, Kerr Coal Co., Cameo, Colo.; for N. Mexico, M. C. Heffelman, Public Service Co. of New Mexico, Albuquerque, N. Mex.; for Utah, Tony Fratto, maintenance superintendent, Independent Coal & Coke Co., Castle Gate, Utah; for Wyoming, Edward Prostel; for Montana, Clem W. Johnson, sales manager, Roundup Mining Co., Roundup, Mont. Following are abstracts of papers prosented at the technical sessions:

Coal's Stake in the Future, by Hon. Elmer F. Bennett, Undersecretary, Dept. of the Interior, Washington, D. C.

Coal production in the western states is substantially lower than it was two or three decades ago. Although this short term view is discouraging, there are brighter factors which augur a better future for coal in the western states. Some indicators are these:

In the past year Pacific Power & Light station at Cameo, Colo., on the Colorado

Coal mines have been reopened and new mines developed in the vicinity of Vice presidents-For Montana, Victor, Carbondale, Colo., for the production Forstrom, Johnson Coal Co., Roundup, of metallurgical coal. In the past year, Mont.; for Colorado, A. Z. Dimitroff, U. S. Steel placed on stream its \$6.5-mining health and safety engineer, million preparation plant at Wellington,

> given to the installation of a power plant at Kemmerer to utilize coal, and the development of a large coal deposit at Lake De Smet is being initiated with the announced intention of generating power for the production of aluminum.

Montana-Dakota Utilities Co. dedi-

Co. completed a 100,000-kw steamelectric plant at Glen Rock, Wyo., and has begun construction of a twin unit. Public Service Co. of Colorado is now building a 44,000-kw steam-electric River.

In Wyoming, consideration is being

cated a new power plant at Sydney in October, 1958, and a contract has been negotiated between the Northern Pacific Railroad Co. and Montana Power Co. for the resumption of coal production at Colstrip, Mont.

In the New Mexico area, a coal lease

was issued during the past year to Utah Construction Co. for 24,000 acres of land on the Navajo reservation, with exclusive rights to mine coal and to develop thermal power facilities.

In anticipation of future growth, El Paso Natural Gas Co. will spend "not less than \$1 million" in development of New Mexico coals to ultimately provide synthetic pipeline gas.

However, the coal industry can ill afford to stand idle and wait for new and bigger markets for its product. Research and development is now big business in this country, with expenditures up to \$10 billion per yr. The coal industry is awakening to the fact that a really bright future can be realized if added time and effort are spent now at the laboratory level.

(Undersecretary Bennett was introduced by M. J. Ankeny, director, U. S. Bureau of Mines, Washington, D. C.

Fuel for Tomorrow's Power, by R. T. Person, president, Public Service Co. of Colorado, Denver.

Coal is the most familiar but least appreciated mineral in the world, but the latter attitude will soon change. The utilities have increased their coal burn 100% since 1947, thus virtually replacing the railroad-fuel tonnage losses. And end of growing demands for power is not yet in sight. Colorado now has an installed generating capacity of 1,-088,000 kw. This will grow to 3,300,000 kw of generating capacity in Colorado in 1975. During this period the westward migration of a mobile population will be accelerated.

The recent recession did little to change the power-use trends in residences. By 1965, there should be a 50% increase in residential power consump-

INDUSTRY MEETING A Special COAL AGE Staff-Written Report tion-up to a total of 4,500 kwh per yr per residence. As electric heating grows, there is a possibility of annual consumption of 17,000 kwh per residence in the area of the power company's operations.

In order to meet present growing demands and to get ready for an annual industrial growth rate of 9% by 1965, western companies are making an investment of over \$1 billion in new plants this year, with more to come.

Coal has the advantage in that a steam-electric station can be located close to load centers while hydroelectric plants cannot. Furthermore, available water must be used for irrigation and other higher purposes. For these reasons it is estimated that thermal stations will provide 55% of the power to the growing west in 1975. Competitive nuclear power may show up in 1965 in areas of high-cost fossil fuels, but is should not be competitive in the fuel-rich west before 1975. Oil-shale gas may be a competitor.

Mechanization alone will not guarantee the competitive position of coal. Still higher efficiency will be required in production operations, and coal and power companies can coordinate their efforts to get higher utilization efficiency. Good management will be more important than ever.

Recent Trends in Coal Strip Mining, by L. M. Cooley, manager, Edna Coal Co., Denver, Colo.

Among the best reasons for optimism in the coal industry are the ingenuity of equipment manufacturers and the skill of managers of coal production. As an example of these factors at work, the cost of removing a cubic yard of earth has been reduced as much as 80% over the past 25 yr through the employment of better tools and methods.

At the present time, about 14% of Colorado's production is strip-mined, although 20% of the non-captive production is mined by open-pit methods. This strip-mined tonnage should double within the next 5 yr.

Other marked trends appear in the move to bigger equipment and in the fact that the strip miner has lost his aversion to going underground. The latter development arises from the mergers between strip-mining companies and companies which concentrated on deep mining. The necessary skills to conduct both kinds of operation are available in newly-merged enterprises. For the former strip miner, punch mining and augering are natural extensions of such mergers.

In moving up to larger stripping units, most operators aim for a stripping goal of from 1½ to 2 million cu yd per month. As the trend continues, we will no doubt soon see a machine with a 100-yd dipper and a deadweight of perhaps 4,000 tons,

Recent unveiling of the newest Kolbe wheel, at Illinois operations of United Electric Coal Cos., reveals a unit that removes and spoils up to 3,500 cu yd per hr. An outstanding feature of the new machine is the high belt speed employed on both digging and stacking operations. Belt speed is 900 fpm on the digging ladder and 1,200 fpm on the stacking conveyor. (A full description of the new Kolbe wheel excavator begins on p 82 of this issue.

Face Dust Collectors, by A. Lee Barrett, director of research and development, Joy Mfg. Co., Franklin, Pa.

The author's introduction to the importance of dust control in underground operations occurred a number of years ago in the mines of the Pittsburgh Coal Co., during studies into the possibility of removing draw rock while recovering coal from the Pittsburgh seam. Later, it became necessary to face the problem of airborne coal dust with the advent of conventional mining. One of the first steps toward a solution was to install water sprays on cutter bars to precipitate dust at its source, as much as possible.

However, the introduction of continuous mining aggravated the problem of dust control, and water sprays proved to be not as effective as was desired. The emphasis now is on the development of an auxiliary air mover of some kind, with or without tubing, that will concentrate dust from the face areas in a controlled stream of air from which the solids can be more easily collected. The Joy Microdyne dust collector offers some opportunities for doing this.

An experimental unit, mounted on rubber tires, has been employed at Joy's experimental mine and has shown remarkable efficiency in collecting solids. "Before and after" dust counts in continuous-mining places show a collection efficiency of as high as 99%, by weight. The unit passes 12,000 cfm of air and requires 5-6 gpm of water to precipitate the dust in that volume.

Joy's researchers now are working on a smaller package—19-in diameter and 54-in length—for mounting directly on the mining machine. This unit, which is designed to pass 7,500 cfm, requires a 20-hp drive and 3-4 gpm of water. One of the persistent problems is that of feeding the required tubing to the advancing—machine.

Where height is lacking perhaps this same unit can be installed in a crosscut with suction tubing leading to the machine at the face. The advantages which should develop from such research are (1) better visibility, (2) improved hygienic conditions, (3) savings in rockdust and (4) elimination of dust from main returns.

Evaluation of a National Safety Prob-

lem - Off-the-Job Accidents, by J. H. McKenzie, assistant safety director, Socony Mobil Oil Co., New York, N. Y. SOUP

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Management in American industry must take an interest in preventing off-the-job accidents in order to keep skilled manpower on the job and to reduce the costs to industry of these accidents. In virtually all situations, off-the-job accidents cause more lost time at work than do industrial accidents.

In a brief flannelboard talk, the author offered his company's presentation on the prevention of these accidents. This presentation is made to employee groups, service clubs and in all other places where the message will be of value in increasing safety in the home, on the highways and in recreational pursuits.

The main points are to convince the listeners to organize for safety, to inspect environments for hazards and to learn the proper steps to take in the event an accident occurs.

Functions and Policies of the Industrial Commission of the State of Utah, by Otto A. Wiesley, chairman, Industrial Commission and Utah Labor Relations Board, Salt Lake City, Utah.

The industrial commission and labor relations board handles cases in workmen's compensation, occupational diseases and employment. The commission was created in 1917, and over the years has increased in effectiveness through cooperation with labor, management, and the medical and legal professions. Most of the statutes governing its operations are the result of agreed legislation which was originally drawn up by these parties in conference.

The commission regulates fees in industrial cases for doctors and lawyers, setting a maximum of 10% of the award, excluding hospital costs. A new step has been the creation of medical panels of experts which provides expert opinion to both sides in dispute free of charge. This step, together with the fact that the procedures are based upon agreed legislation, has made for smoother relations and fair awards in industrial

The Utah plan has been roundly criticized in some quarters. However, it is based upon sound moral, social, medical and legal principles.

Responsibilities of Management and Engineers in Helping the Coal Industry Get New Money to Perpetuate Itself, by J. W. Woomer, consultant, J. W. Woomer & Associates, Pittsburgh, Pa.

To deny a need for increased coal production in the near future is to deny all forecasts of growth by utilities, the steel industry and other large enterprises. It is necessary, therefore, for coal men to recognize this future need for coal and to locate and recognize

August, 1958 . COAL AGE

sources of future risk capital. This will require that certain fundamental changes be made, in view of the prevailing situation and the coming need for coal.

Production capacity of present U. S. bituminous mines now is about 600 million tons per yr. By 1975, 800 million tons a yr will be required. The curve of coal consumption should start up shortly after 1960 and it should steepen after 1966. By 1975, most present capacity will have to be replaced, and the total investment required to create an annual capacity of 800 million by that time will be at least \$8 billion.

Right now coal suffers somewhat in the financial market because of its overcapacity to produce and because of the glamor of the words "atomic energy."

In the years immediately ahead, labor must be careful in its demands to prevent coal from being priced out of the market. Government must be fair on taxes and depreciation and depletion allowances. Through these steps the industry will have money to reinvest and will be in a better position to scout new capital. Insurance companies, banks and the public are possible sources.

However, education of the public on the values of coal in the national economy is not the only answer. Managers and engineers within the industry must constantly strive to increase production efficiency.

The industry is on the threshold of dynamic change. All parties must be vitally interested in gaining for the industry the best possible publicity, since bad publicity adversely affects the sources of new money. Furthermore, a deeper interest in research must be generated.

Power Distribution and Power Cables for AC Shuttle Cars, by Tony Fratto, maintenance superintendent, Independent Coal & Coke Co., Castle Gate, Utah.

Mining in the C Seam at Castle Gate is 100% AC powered, including shuttle cars. Power is taken under ground at 4,160 V to load centers where it is stepped down to 480/240 V. Transformers in the load center are connected delta-wye, which provides a natural neutral point in the secondary for easier grounding. A grounding resistor is connected in this neutral of such value that ground current in the event of fault is limited to 5 amp.

A major feature of the Castle Gate installation is the use of flat trailing cables to conduct power to shuttle cars. Type G cables did not stand up well in service, primarily because in most instances of damage the results were phase-to-phase failures. These are difficult to locate.

The cable now being used is a 5-conductor flat Anaconda cable. A flat grounding conductor is carried between



PRESIDENT-ELECT-W. K. Dennison, Kaiser Steel Corp., heads RMCMI in 1960.

pairs of phase conductors, thus insuring that failures will be phase-to-ground, not phase-to-phase.

The cables have been in service for more than a year, and have not given any trouble in that time. A substantial reduction in costs of supplies and labor for cable maintenance has resulted.

Bending Coal Mine Roof, by Earl R. Maize, mining health and safety engineer, roof-control research group, USBM, Pittsburgh, Pa.

Improved injecting equipment for roof-bonding resins, in tests jointly sponsored by American Cyanamid Co., National Mines Corp., Renton, Pa., and the Bureau of Mines, now makes it possible to more closely match the bonding activities to an operating cycle. The basic machine is a Fletcher roof drill to which has been added a set of dual pumps to handle resin and activator. The pumps are driven by the hydraulic circuits of the drill and can generate a maximum injection pressure of 3,000 psi.

The site selected for the latest series of tests was a set of eight butt entries in the south portion of Renton mine. In this area major roof failures occur in the laminated shales over the Thick Freeport seam and consist of cutters which show up primarily in development work.

The procedure was to place two crossbars in each 10-ft cut as the coal was loaded out. The bonding machine then followed the loading machine into the place and drilled four roof holes in each cut, two of them near the face. About 2½ gal of bonding resin per lineal foot of entry was pumped into these holes. From 2 to 2½ cuts were loaded and bonded each shift.

The bonded areas are instrumented to show roof movement after bonding.

Both epoxy and polyester resins are undergoing tests.

To determine the number of layers bonded, a hole in the roof was shot down at one intersection to make a cavity about 48 in in diameter and 40 in deep. The bedding planes in the roof had been bonded at five horizons and the resin had moved through several vertical cleats.

In the test section, 775 lineal ft of entry has been bonded through 251 roof holes. When the section has been developed further and the entries and crosscuts are no longer needed for travel, it is planned to remove the crossbars from the bonded area and thus determine the ultimate efficiency of the bonding.

Coal Mining in Australia, by Leif Arentzen, Lee-Norse Co., Charleroi, Pa.

The author recently visited Australia upon the installation of a Lee-Norse Miner in South Lambie mine in New South Wales. The mine is situated in the South Coast field, about 60 mi south of Sydney, about 3 mi from the coast at an elevation of 500 ft. The mine cars, which are dumped at a tipple near the portal, are of 10-ton capacity. A retarding belt conveyor lowers coal from the tipple to a cleaning plant near sea level. The retarding conveyor is 1,600 ft long. Seam height is 10 ft with rolls in the roof and bottom. Ash content is about 11%, inherent.

One of the major problems is the presence of non-matched equipment in producing sections. However, the Australian officials can handle this one with relative ease. Of greater concern are the taut labor relations, which are further aggravated by a Communist agitation, particularly against mechanization.

Single-shift operation is the rule, and this also hinders mechanization. Where a second shift is agreed upon, only development work can be done. However, the typical Australian manager is an individualist, and the "Down Under" coal industry is trying valiantly to establish itself in the export market.

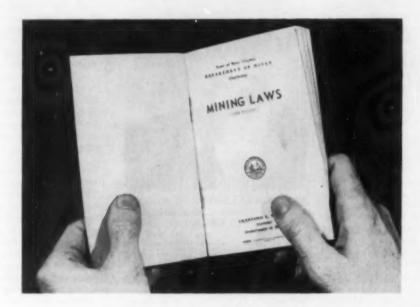
Preparation Makes the Product, by Warren Gerler, Link-Belt Co., Chicago, Ill.

Mr. Gerler introduced a Link-Belt motion picture (20-min, sound, color) of the title above, on the operations of the Moss No. 3 plant of Clinchfield Coal Corp., Moss, Va. A full description of the plant appears in the July, 1959, issue of Coal Age, beginning on p 80.

Hydraulic Oils, by R. E. Cope, Texaco, Inc., Denver, Colo.

Mr. Cope introduced a 20-min, soundcolor film dealing with the characteristics, testing and compounding of hydraulic fluids for industrial applications.

## Foremen's Forum



# Legal Responsibilities Of Mine Supervisors

THIS IS A REMINDER of the legal responsibilities that go hand-in-hand with a job as mine foreman, assistant mine foreman, fireboss or mine engineer. In a number of recent cases mine officials have had their certificates of competency revoked and others find themselves in binding situations. Some of these revocations were for permitting men to enter mines where known dangerous conditions existed. Others were for exceeding legal maximums on crosscut center distances.

Apparently, it is possible to get into legal difficulties, and to jeopardize your certification, even though you think you are thoroughly conversant with the law. However, we beg you to realize that in many coal-mining states the laws are being recodified, rewritten, brought up to date or otherwise changed. We strongly suggest that you write to your state department of mines or see your district inspector for a copy of the most recent revision of the law that governs your job and sets your legal responsibilities.

The past history of mining legislation is a tale of knock-down, drag-out battles

in the field and in the state capitals. However, recent revisions have been presented before legislatures as "agreed" bills, meaning that all interested parties—labor, management and enforcement officials and their counsellors—have conferred and finally agreed on the proposed legislation. Therefore, when the law enumerates the requirements of your job, you can be sure everyone agrees that these are the responsibilities for which you should be held legally accountable.

#### The Folly of Cutting Corners

The fellow who is arrested for speeding on the highway usually is not a deliberate, willful lawbreaker. In many instances, these people are exceeding the speed limit for what appears to them to be good reasons at the moment. However, the law says there are no good reasons for speeding and many good reasons for not speeding, so the speeder takes his medicine.

Similarly, in coal mining the boss who delays turning crosscuts at the

proper time may get sympathy but little else when the inspector catches up with him. A responsible company does not want to find its bosses in this kind of situation. The ideas of the company on these matters most likely are incorporated in the law.

Perhaps the foreman who takes liberties with crosscut distances feels that 5 ft more of advance in the room or entry will sweeten production totals, because, after all, turning a crosscut does take time. But in the eyes of the law higher production is never a valid reason for stretching the law. On the other hand, there are good safety reasons for driving breakthroughs on legally specified centers.

In other instances, a foreman may increase center distances between openings because in his judgment the natural conditions demand this course of action. Please accept this suggestion: Do not use your own judgment on points where the law makes explicit demands. You may have no defense at all, and neither the inspector nor anyone else can help you. After all, the inspector has his own legal responsibility, that of enforcing the



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#### Foremen's Forum (Continued)

law, fully impartially, constantly.

We recognize that there are times when the law may become burdensome. Meeting the requirements of the law may, at certain times, exert a drag on progress. Even under these conditions there still is no excuse for "cutting corners," because there are ways of obtaining relief.

#### How Mining Laws Are Changed

In one of our coal-mining states the legally stipulated distance between crosscuts was 45 ft, for years and years. As continuous mining came into use it was realized that this short distance would severely limit the inherent efficiency in the new mining method. There would be too much maneuvering and too little straightaway advance to get the most out of the new, big machines.

However, the law was not changed by a mere stroke of the pen. Time and study were required to accomplish the change. First, it had to be demonstrated that adequate ventilation could be maintained if the distance between crosscuts was increased to accommodate the new continuous miners. This required the development of new air-coursing techniques which could be applied on a production basis. Time, energy and money were spent on the necessary experiments.

The result was that in due course the law was amended to permit a 60-ft distance between breakthroughs, as measured along the rib of the block from one breakthrough to the next. This change in the law opened the door for continuous mining, without undermining the safety reasons for which the original distance had been specified. Auxiliary fans, and the laws governing their use, are now undergoing similar study. You can see that the law is not changed on whim.

In other states, the subject of maximum voltage in distribution and trolley lines is being investigated. A change to higher legal voltages may be in the offing, but you may rest assured that it will be accompanied by new rigid specifications covering electrical installations. Increasing safety for personnel is the primary reason for having mine laws, and this will not change.

Then there are times when unusual conditions do arise at individual mines. A change in the law for all mines is not warranted nor reasonable, but meeting the letter of the law at the affected mine becomes needlessly burdensome. For cases of this kind, most states provide that directors or chiefs of department of mines may permit changes in operations to offset the unusual condi-

tions. However, this permission is never lightly granted. The usual procedure is for the department chief to appoint a commission of experts who study the situation, suggest a remedy and impose limitations in the new, temporary relief permit.

It is an involved process and it seldom swings on the judgment of only one man.

#### Intra-Company Relationships

Each certified mine official operates in two spheres. He has these legal responsibilities and he has a production function. In his relationships with other supervisors, such as chief electricians, ventilation inspectors, maintenance officials and so on, he must be guided by the company organizational setup, as far as production is concerned. But in matters where the certified man's legal responsibilities are affected, he must give priority to these.

In some states the mine electrician

may be a certified official with his own legal responsibilities. There should be no conflict between officials because there will be no areas of conflict written into the law. In any event, a perfect understanding of the legal requirements of his own job will prevent an official from broaching the precincts of another certified official.

In instances where an argument or conflict does arise, the matter should be appealed to the next higher level of management for resolution. In any event, the certified, responsible official cannot overlook his legal responsibilities. They do come first.

The responsibility of your job is awesome. However, the authority you need to discharge that responsibility is available. For example, a fireboss engaged in his legally specified duties is a supreme authority. Assuming he finds a hazardous condition, he can order everyone to leave the mine. And that includes the president of the company and the governor of the state if they happen to be there.

#### Does Inflation Scare You?

ARE YOU afraid of inflation? You should be! Inflation reduces your buying power, increases your taxes, shrinks your savings and insurance, threatens your retirement, reduces fixed incomes and so on and on.

Here are a few things you should know to understand inflation and its effect on you:

Money isn't wealth. Goods which meet our needs are wealth. So are services which meet our needs. Money only helps us exchange goods and services.

You could have all the money in the world, but if there were no goods or services to buy with it, you'd know for sure that money itself is not wealth.

A SAFETY INSPECTOR was retiring and the superintendent was making the farewell speech at a general safety meeting. The super wound up with this:

"He moved straight toward his goal. He looked neither to the right nor to the left, but pressed forward, moved by a definite purpose. Neither friend nor foe could delay him nor turn him from his course, and all who crossed his path did so at their own peril. You all know who I'm talking about, don't you?"

Voice from the crowd: "Yeah, he's the shuttle car driver on my Now, if enough people continually demand, and get, more money—even though their work doesn't meet more needs—that is, if their work doesn't produce more goods and services—soon there will be more money around, but not more goods and services. When that happens—and it is happening right now!—more money is asked for what goods and services there are. So, prices go up., and up.

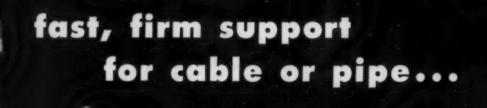
Since there is only so much goods and services around—and these are exchanged for money—it's not surprising that some persons use pressure, not rights, to get more money, thus boosting costs and prices and increasing inflation.

So, while those who can demand, and get, more money can buy as much or more of the goods and services available, many, many others cannot. Those on fixed incomes, for example, can buy less and less and we get more inflation.

But those on fixed incomes are not the only ones who suffer from inflation. Inflation robs everybody. When the supply of money increases without an accompanying increase in the production of goods and services all of us suffer.

The value of the dollars we have put in the bank or invested in insurance policies or bonds shrinks and shrinks. And our buying power shrinks right along with it. So, if you are afraid of inflation, don't feel bad about it. You should be afraid of it!

-Reprinted from US Steel News.



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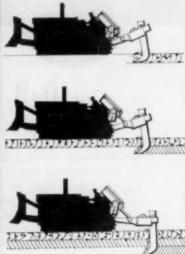






## Operating Ideas





TODAY'S tractor and ripper moves 300 to 600 cu yd per hour. Ripping depth depends on type of material.

#### Applying Rippers to Reduce Rock-Breaking Cost

SUBSTANTIAL savings, more than onethird on typical jobs, can be realized by operators who replace drilling and blasting with ripping, according to R. D. Evans, staff consultant, Caterpillar Tractor Co. The following information, adapted from Mr. Evans' talk delivered at the Society of Automotive Engineers national west coast meeting, sums up what ripping is, how it is done and how savings are achieved.

The purpose of ripping is to break up hard masses so the material can be handled more easily. Many specialized rippers have been built. One, with a single tooth, can be pushed by a second tractor to obtain needed force and penetration. Pipeline and coal rippers have extra heavy frames and extra long teeth. Mountings, frame and body structures and controls made by various manufacturers are similar, but shanks, boots and points vary widely to meet field conditions.

The modern hydraulic ripper is mounted at the rear of the tractor. Constant power for raising and lowering the draft frame is provided by a pump driven off an engine live shaft. A clevis, mounted on the draft beam, holds the ripper shanks. In some types the clevis has a swivel action, easing tractor steering and permitting the shank to work around buried hard objects, reducing shock on the equipment.

The most important function of the clevis is to provide hole patterns for positioning the ripper shanks to meet conditions. Success or failure often depends upon proper depth and ripping angles.

Shanks fall into three categories: straight, curved and modified. A straight shank can successfully handle a wide variety of materials and penetration depths, because of its ripping angle and ability to stay down in blocky and slabby materials. Curved shanks work best in non-slabby materials, where the lift action gives good fracture for effective scraper loading. Some shanks have been modified to obtain a more favorable penetration angle.

Ripper points, regardless of size and shape, must provide good initial penetration, good fracture characteristics and good wearability.

Ripping procedures vary for transportation methods. For dozing, a minimum of ripper passes is made to keep cost low. More passes must be made to produce smaller pieces for scraper loading. For handling with a shovel, the material need by only small enough for the dipper to handle.

#### How Ripping Is Done

The tractor usually works in first gear to keep it from stalling on hard spots. Normally it is advantageous to start ripping with one tooth, adding more if the material is penetrated easily and breaks in satisfactory sizes. In slabby material, two or more teeth may act as a rake, reducing production.

In general, rip as deep as possible. But this may raise the rear of the machine off the ground or take too much weight off the front idler, thus reducing traction, decreasing production and increasing maintenance.

Space between passes is governed by desired size. If full depth can be used, 3 to 5 ft is usually satisfactory. In crumbly material, use 6- to 8-ft spacing. For scraper loading, rip in the same direction as loading.

In most applications the direct-drive tractor is more satisfactory than the torque converter drive. It produces more positive pressure and shock loads to fracture and break out tough material. But if the tractor will be push loading scrapers at least 50% of the time, a torque converter may be better.

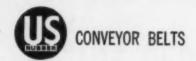
Ripping costs compared with blasting costs must be favorable to justify its use. Under typical conditions, a 320-hp diesel tractor with ripper and dozer can move 300 to 600 cu yd per hour. It costs \$19.36 per hour to operate a large tractor, including depreciation, operating costs and operator. This cost must be weighed against the cost of drilling and blasting.

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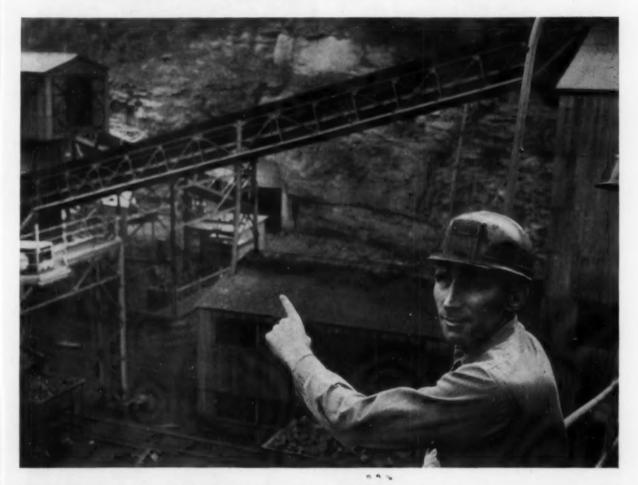
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COAL

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# "After 20 years, 'U.S.' still gets the replacements," says plant foreman



Mr. James Campbell of Guyan-Eagle Coal Co., Kelly (West Va.), knows why Guyan-Eagle has been using (and replacing with) "U.S." belts for the last two decades...why today they have 17 belts operating in their 5 mines. In the words of the company's own officials, U.S. Belts are:

"The most dependable in our experience."

"Resistant to abrasive action of rock."
"Strong, durable — maintenance is minimum."

That's why, when Guyan-Eagle opened its latest mine (No. 5) it was no surprise that they equipped the system with "U.S." Belts to move the 5,000-ton daily output. Once a "U.S." Belt user, always a "U.S." Belt user.

The 6 "U.S." Belts in No. 5 mine range in size and capacity from the 195', 42"-wide stoker coal conveyor up to the 1700' main slope belt, a 48"-wide U.S. Giant® carrying 515 tons of ROM coal (up to 500-lb. lumps) to the shaking screens in the scalping plant. All are performing perfectly.

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## Operating Ideas (Continued)





#### Piggyback Generator Saves Gas

D. E. Shuck, Division Transportation Supervisor, Indiana & Michigan Electric Co, Marion, Ind.

HERE'S an unusual idea, published in a recent issue of *Electrical World* that offers interesting possibilities for companies using radio-equipped trucks or automobiles.

Powering truck radios through a piggyback generator and separate battery saves gasoline for Indiana & Michigan Electric Co. An average of \$32 per truck per year is saved because it is no longer necessary to leave the motor running while using the radio.

The piggyback generator is strapped to the standard generator, and the auxiliary battery is located where convenient. This equipment is used to furnish power for the radio only.

The total cost of \$97 is divided as follows: generator kit, \$67; battery, \$15; and installation labor, \$15. Because the heavy-duty low cut-in generator formerly used cost \$88 more than the standard generator normally supplied with the vehicle, the new installation adds only \$9.

When fully charged, the battery supplying the radio will run at least a full day with radio on standby. It will also permit transmitting for at least an hour. The motor can be started at any time to recharge, if unusual service requires this. A half-discharged battery can be recharged in about a half hour of running time. Recharging would usually take place during normal vehicle service.

An additional advantage of the auxiliary power supply is that 6-V radios can still be used on newer cars with 12-V electrical systems, avoiding conversion costs of up to \$150.

#### **Knowing Your Oxygen Cylinders**

YOUR COMPANY uses oxygen cylinders every day but, except for the fact they hold compressed oxygen, how much do you know about them? For instance, do you know how they are made, what standards they must meet and how they are protected against damage? The following information, published in Linde Tips, provides the answers to the above questions.

Shells of your oxygen cylinders are deep drawn from high-grade steel billets. They are carefully heat treated to remove harmful stresses which may be set up while the shell is being formed. This treating develops strength and toughness in the shell and gives it longer life.

Oxygen cylinders must withstand a pressure of at least 3,360 psi-53% above the normal charging pressure of 2,200 psi. To check on cylinder strength, this overload test is repeated at least once every 5 yr of service.

#### Cylinder Arc-Burning Is Costly

Every time a cylinder is refilled it is inspected for any obvious damage, such



as dents or arc burns. If a cylinder is damaged, it is taken out of service. This costs money for everyone. Prevent costly arc-burning by keeping your cylinders away from metallic walls or partitions; your power supply, cable or defective insulation; anything that is grounded and at least 6 ft from your workpiece.

Valves on Linde cylinders are sturdily designed. The valve should be opened slowly and as far as it will go. Never lubricate the valve—all you need is a firm grip on the hand wheel.

It's almost impossible to interchange your oxygen and acetylene regulators. Oxygen-cylinder valves always have external right-hand threads, while acetylene-cylinder valves have internal lefthand threads.

The Linde oxygen cylinder has a sealing arrangement to prevent leakage around the stem when the valve is fully open. Occasionally, however, the valve may leak when it is fully open. Tag the cylinder as defective to stop somebody else from using it and notify your supplier. He will replace it.

#### How Cylinders Are Protected

A safety nut is located on the back of the valve opposite the regulator connection. It contains a special metal disc which ruptures, releasing the oxygen, if cylinder pressure increases too much, for any reason, such as exposure to heat.

Every oxygen cylinder is equipped with a metal cap over the valve. It prevents damage to the valve if the cylinder is overturned while not in use. It also protects the valve from oil or grease which may ignite violently if it comes in contact with oxygen under pressure.

## THIS DECISION WILL PAY **BONUS PROFITS** OF MORE THAN \$6,500 EVERY DAY!

This order and installation of Wemco-Fagergren Flotation Machines by a leading coal producer will result in additional profits of over \$6500 per working day—and for surprisingly low capital investment. Cost of the total plant addition, including the flotation cells, will be offset in less than four months.

This is another example of how Fags go to work-profitably. Recovery is consistently higher; floor space, maintenance and operating labor, reagent and other requirements are less.

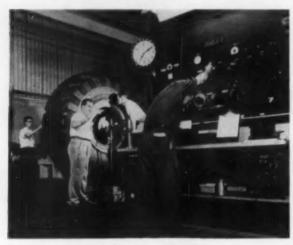
The Wemco-Fagergren record of profit-producing installations tells the story of sound experience. The men of Wemco will be glad to furnish all the facts and discuss why Wemco-Fagergren Flotation will do a better jobwhere flotation has a place.





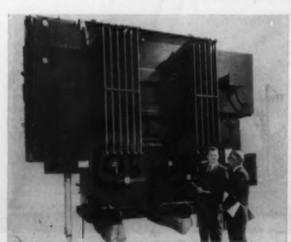
E M C O R a division of
Western Machinery Company, 650 Fifth St., San Francisco, Calif. and throughout the world

## **Equipment Developments**



#### Motorized Wheel

A motorized wheel designed to give large earth movers unmatched versatility has been designed by General Electric Co., Schnectady 5, N. Y. GE declares that the wheel gives the highest horsepower utilization throughout the vehicle speed range of any available drive as well as making possible more maintenance-free working days per job. The drive, designed for large off-highway vehicles, eliminates transmissions, axles and gear shifts by including the electric traction motor as an integral load-carrying part of the wheel. Because motorized wheels can provide all-wheel drive from a single engine supplying electric power through a DC generator multiple engine arrangements are unnecessary. Braking is accomplished under the dynamic braking concept, meaning the energy of the vehicle's motion is converted into electrical energy by the traction motors acting as generators. The electrical energy is dissipated as heat to stop the vehicle. Stopping in three vehicle lengths at 35 mph is possible, says the manufacturer.



#### Vapor-Cooled Transformer

The first commercial vapor-cooled transformer, according to Minnesota Mining & Mfg. Co., St. Paul 6, Minn., is smaller,

safer and operationally more efficient through the heat-transfer properties of "3M" inert fluoro-chemical liquids. Westinghouse Electric Corp. is building the new transformers ranging in rating from 15-kw, 500 kva to 34.5 kv, 200 bil, 7,500 kva, and Minnesota Mining produces the chemical liquid. Besides recognized safety of modern sealed dry-type transformers the new liquid-filled, oil-immersed units are said to provide savings in installation, reduction in weight, reduction of temperature rise of an open-tank surface and lower thermal aging rate of insulating materials. Additional features are more overload capacity, quieter operation and savings in maintenance, according to the firms. The liquid coolant, FC 75, is non-toxic and can be stored in any clean container, metal or glass, indefinitely.



#### Lightweight Cap Lamp

An Edison cap lamp that weighs less but gives more light has been developed by Mine Safety Appliances Co., Pittsburgh 8, and McGraw-Edison Co., West Orange, N. J. The headpiece, providing 15% more light, according to the firms, features a simple bezel ring focusing arrangement which is positioned without focusing tools. The reflector, lens, bulb and housing function as one unit to produce a positive "spot" and brightest possible illumination. The bulb has two filaments, each with a 400-hr service rating. If one burns out a headpiece switch energizes the other. The Model S lamp, approved by the U.S. Bureau of Mines, includes other features such as a new softrubber sealing gasket between case and cover, spot-welded battery connectors, sealed-in cable-to-battery connections and spring-tension-type terminals. Addition of a new active material to the Edison nickel-iron alkaline battery provides increased dependability, longer service life and improved operating economy, says the firm, which conducted comparative tests of the material with other Edison batteries under severe operating conditions. Low-voltage charging equipment makes possible substantial lamphouse savings, adds MSA.



The quality of the perforated plate you use in vibrating screens can make the difference between profit and loss in mineral preparation. That's why it's a smart idea to use Hendrick H Quality Steel Perforated Plate.

This plate stands up under continuous, heavy-duty operation. It screens coal easier, faster. Full clearance practically eliminates blinding. Deck changes are fast, permitting savings in labor costs. Large open area offers maximum protection.

Hendrick H Quality Steel Perforated Plate

is made from high carbon or stainless steels, carefully developed by Hendrick after many years of experience. It is available either flat, corrugated or stepped, in any desired shape, and with perforations of any size. Write for information on the type of H Quality Perforated Plate that will best fit your operation.

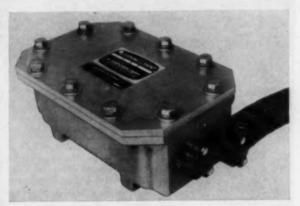


PERFORATED METAL • PERFORATED METAL SCREENS • WEDGE-SLOT SCREENS • HENDRICK WEDGE WIRE SCREENS • ARCHITECTURAL GRILLES • MITCO OPEN STEEL FLOORING — SHUR-SITE TREADS • ARMORGRIDS • HYDRO DEHAZERS • DISTILLATION COLUMN INTERNALS.



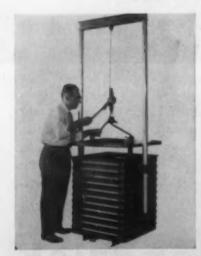
#### Repairing Belts

A new conveyor belt repair kit employing a chemically cold self-vulcanizing repair material solves many of the problems in maintenance and repair, according to Automatic Vulcanizers Corp., New York 13. Marketed under the "Pang" tradename, the cold vulcanizing material, effective with rubber, leather, steel, wood, textiles and other compositions, is a rubber compound with rubber characteristics of tensile strength, flexibility and elasticity, according to the firm. Advantages cited for the repair method include: elimination of any metal plates or rivets which might cause pulley problems; work by one man; and no special tools needed. When vulcanizing is complete, a permanent bond is assured, according to the firm. Patching material comes in sheet form and can be cut into various shapes and sizes. Equipment need not be dismantled, thus different sections can be repaired simultaneously.



#### **Electronic Protection**

Positive protection against ground faults and short circuits on DC off-track mining machines and trailing cables is now possible with "Lectronic Sentry," according to Joy Mfg. Co.'s Electrical Products Div., St. Louis, Mo. The two-part unit with transmitting and receiving elements instantly removes power completely from the trouble-causing machine and/or cable whenever the continuous monitor signal of the "Sentry" is interrupted. It is able to distinguish between normal conditions of overload and potentially dangerous short circuits, reports Joy, which adds that the U. S. Bureau of Mines has accepted the machine for use on permissible equipment. Because it functions without the use of a grounding conductor, the Sentry allows use of less expensive 2-conductor cable, resulting in more flexibility and longer range of movement for off-track equipment. Less cable means fewer repairs of cable and less down time, notes Joy. With the Sentry, there is no destructive arcing caused by heavy fault currents, as might be the case where a ground wire is used, and the electronic control is designed as to be fail safe so there is never any false sense of security, according to the manufacturer.



OIL-IMMERSED CONTROLLERS— Two classes of oil-immersed explosionproof 2,000-5,000-V starters for hazardous and semi-hazardous locations have been announced by Allis Chalmers Mfg. Co., Milwaukee 1. These NEMA Class E1 starters are rated at 50 mva inter-

rupting capacity and provide built-in short circuit protection to a motor on systems having a maximum of 50 mva capacity. Available in a floor-mounted lift-out type or in a frame-mounted tank-lowering type the starters have, among other features, a recessed clear-oil-level sight gage, segregated high and low voltage panels, heavy corrugated oil tank and stainless steel cover hardware.



DIESEL PLANT - Jeta, Inc., Yonkers, N. Y., announces a new 60-kw diesel

electric generating plant. Adding to the firm's "Jetapower" line of plants, the new unit, Model CD-6018, is a unitized three-phase, 60-cycle setup with an output of 120/208 V AC. It develops speed of 1,800 rpm from a water-cooled 6-cylinder engine. Standard equipment includes 24-V electric-starting and battery-charging systems.



BRUSHLESS GENERATOR - A new package brushless generator designed to

August, 1959 . COAL AGE

B.F.Goodrich



## B.F. Goodrich tires carry 44-ton gross loads for strip miner, still can be retreaded twice

J. Robert Bazley, Inc. of Pottsville, Pa., strip mines throughout the anthracite region, also builds roads all over the state. The company operates 217 rubber-tired vehicles working as many as 70 hours a week. The truck above carries 22 tons of rock and dirt overburden. Add the vehicle weight, and you have a 44-ton gross load for those tires to carry over razor-sharp rock!

Yet the tires can be retreaded twice! This is possible because the tires are B.F.Goodrich Rock Service tires—specially built for this kind of work. Massive double-chevron cleats defy rock cuts and bruises, pull in forward

or reverse. B.F.Goodrich FLEX-RITE NYLON cords withstand double the impact of ordinary materials, resist heat blowouts and flex breaks. Result: this B.F.Goodrich Rock Service tire body outwears even the extra-thick tread, can be retreaded again and again!

Follow the lead of successful strip miners like J. Robert Bazley. Switch to B.F.Goodrich Rock Service tires. You'll be dollars ahead. Your B.F.Goodrich Smileage dealer is listed under Tires in the Yellow Pages of your phone book. See him today. The B.F.Goodrich Co., Akron 18, Ohio.

Specify B.F.Goodrich tires when ordering new equipment



## B.F. Goodrich off-the-road tires

#### Equipment Developments (Continued)

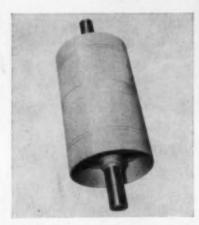
eliminate sparking has been announced by Allis-Chalmers Mfg. Co., Milwaukee 1. Shorter and streamlined, the generator has its auxiliary equipment compactly mounted within the yoke enclosures. This permits direct mounting of a switchboard on top of the unit keeping cable runs to minimum lengths, says the firm. A selection of adapters makes it possible to attach the generator to most drivers, and equipment may be modified to include accessories such as 3-phase voltage sensing, cross current compensation for parallel operation and frequency meter or combination for frequency elapsed time meter. Units are available with ratings of 100 kw, 125 kw, 150 kw and 175 kw, 60 cycle, 1,800 rpm.



LARGE VIBRATOR -- A massive new pneumatic vibrator delivering 16,000 lb of impact has been announced by Cleveland Vibrator Co., Cleveland 13. For vibrating tables, hoppers, large bins and railroad cars, this Model FAC operates on 60 to 80 lb of air pressure. Weight is 539 lb.



PREVENTS GALLING—A specialized lubricant that prevents galling and corrosion of tapped threads is a new product of Keystone Lubricating Co., Philadelphia 32. Known as Keystone No-Gall lubricant, it is a special zinc-base lubricant made in plastic consistency for brush or paddle application and does not dry out or harden, notes the firm.



MAGNETIC PULLEYS—An improved line of ceramic-powered radially designed pulleys are available from Eriez Mfg. Co., Erie 6, Pa. Because of design, says Eriez, the new deep magnetic field of the radially-designed pulley is found more effective in removing medium and large tramp iron, especially at higher speeds. "Ultra Hi-Powr" and "Super Hi-Powr" ceramic magnetic pulleys are offered in five standard diameters from 12 to 24 in and in belt widths from 12 in up.



LUBRICATION—A complete packaged lubrication unit with built-in safety features is now being manufactured by Nordberg Mfg. Co., Milwaukee, Wis. It can be adapted to crushing and processing equipment in the field as well as to many other types of mechanical equipment, declares the firm. Units come for 21, 25 and 50 rpm output with an available operating range of 20% above and

below this figure based on 500 Saybolt universal lubricating oil at 100F and 50psi pump outlet pressure.



TWO-WAY RADIO — A transistorized two-way radio communication setup has been introduced by General Electric Co., Communications Products Dept., Lynchburg, Va. Available in units up to 75 W, they are said to feature the smallest battery drain made in the mobile communications field. The GE line ranges down from the 75-W category to 30- and 10-W units in sizes as small as 8% in wide, 12 in long and 4 in high. Only three tubes are used in lower wattage categories and four in 30 and 75 W models, states the company.



SPEED REDUCERS—Recent additions to the line of Lima Electric Motor Co., Lima, Ohio, are shaft-mounted speed reducers. Minimum mounting space is a key feature, says Lima, and each unit may be operated over a wide range of speeds by using a variable-pitch pulley or by changing sheave combinations. Available in single and double reduction units, the reducers use standard V-belts and pulleys and have a torque arm permitting easy, infinite belt adjustments, according to the manufacturer. Capacities run from 1 to 40 hp with single-reduction gearing with output speeds from

## NOW...SAFETY...ECONOMY

at High Thermal Efficiency

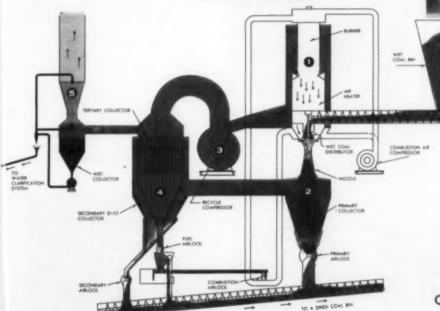
and Low Product Temperatur

## FAIRMON - built TAILOR

## STREAM-FLO

#### THERMAL DRYER\*

\*Tailor Stream-Fio Thermal Dryer is the trade name for thermal dryers of Tailor and Co., Davenport, lowa.



Surface moisture removed from coal and other solid mate-, rials without threat of explosion and internal fires!

This revolutionary achievement is accomplished by the new Tailor Stream-Flo Thermal Dryer that combines continuous pressurized drying at high thermal efficiency and low product temperature. Inert atmosphere, pressurized by a compressor system, assures non-turbulent action that is safe and economical.

The new Tailor Stream-Flo Thermal Dryer operates by gravity, dries feed products instantaneously up to 2"... recovers the finest dusts easily and effectively.

Only five major compact elements comprise the new Tailor Stream-Flo Thermal Dryer. Simplicity of their design eliminates costly auxiliary equipment, including ash removal and handling units; holds space requirements to a minimum; drastically reduces maintenance and repair.



-	-		-
4			
8		Large Size Coal (majority of product)	
	3223	Fine Dust	
		Extreme Fine Dust	
		Outside Air (atmosphere)	
		Flame in Burner	
		Heated Gas	
		Recycled Gas	
	25.5	Completely Scrubbed Gas Exhausted to Atmosphere	
		Partially Scrubbed or Cleansed Gas	
	7	Cool	
		Water Containing Extreme Fine Dust	

#### Only five major elements comprise the entire Dryer system:

burner-heater with combustion air duct assembly

drying nozzle and primary collector

recycle compressor

secondary and integrated tertiary dust collectors; and

wet collector and exhaust duct for scrubbed gas

FAIR MONT
MACHINERY COMPANY
FAIRMONT, WEST VIRGINIA



#### Equipment News (Continued)

90 to 420 rpm; double reduction units from 1 to 30 hp with speed ranges from 10 to 160 rpm.





CARBON MONOXIDE TEST-Mine Safety Appliances Co., Pittsburgh 8, has devised a 50-sec test to determine the carbon monoxide concentration in the blood stream. In the top photo, the subject exhales into a specially-designed balloon while the tester readies his equipment. In the lower photo a chemical indicator tube is inserted into the balloon and connected to an aspirator bulb. A controlled amount of the sample is drawn across the tube which changes in color from yellow to a shade of green in direct proportion to the concentration of CO in the sample. Reference to a conversion table gives the actual percentage of CO in the subject's blood.

The MSA CO kit can also be used for blood sample analysis when the subject is unconscious or unable to inflate the balloon.



SMALL HOLDER-A new 350-amp water-cooled manual Heliweld holder for use with its tungsten-inert-gas process has been announced by Air Reduction Co., New York 17. As small as most conventional 200 amp holders, the H35-B can be used to weld stainless steel, aluminum, copper, magnesium and other special metals and alloys in a welding range from thicknesses paperthin to 1/4 in or heavier, depending on the metal and type of current used. Features include a completely enclosed water cooling system to minimize leakage and which requires no "O" rings; transparent plastic tubing on all hose assemblies to allow a visual check on water flow at all times; and hoses equipped with nuts and glands for easy removal.



NEW DRILL—A tractor-mounted drill for International TD-9 and TD-6 crawlers now is being sold by International Harvester construction equipment distributors. The B-40 "Explorer," made by Mobile Drilling, Inc., Indianapolis, Ind., is designed for hardrock drilling to



McNally Two Stage Crusher This unit consists of a double roll primary crusher mounted above a double roll secondary crusher—compactly arranged into a single rigid structure.

Available From Stock as d on Short Delivery
For immediate action on complete information write,
wire, or call

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas

Wellston, Ohio

CC



# Any way you look at 'em ...

You can't beat

## KERSEY TRACTORS

for moving men and supplies Faster!



PPC-9 PERMISSIBLE, PERSONNEL, SUPPLY AND SERVICE TRACTOR

Provides maximum safety . . . maximum time-saving

Used as mechanics car, supply truck or emergency vehicle. Rear cargo deck will accommodate stretcher to take injured personnel out of the mine. Detachable rear cargo compartment has a capacity of 2,000 lbs.

MODEL 944 HEAVY DUTY, 4-WHEEL DRIVE, 4-WHEEL STEER AND 4-WHEEL BRAKE TRACTOR

For heavy loads . . . Long hauls

Weighing 9,200 lbs. this Super Duty 20 H. P. tractor with Pow'r Lok axle assemblies assures positive 4-wheel traction for moving heavy machinery, or pulling a train of supply or man trip cars.

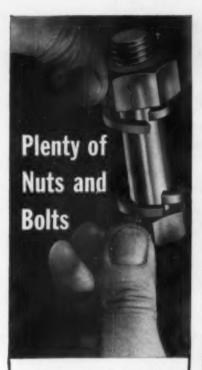
#### RMT-RAIL TYPE SERVICE TRUCK

Utility Vehicle For Mechanics, Electricians, Officials

This heavy duty utility truck with 1,000 lb. cargo deck on each end can be used by the construction gang to move men and materials, by the Mechanics and Electricians for their tools, parts and motors, and by Bosses and Inspectors to travel about the mine.



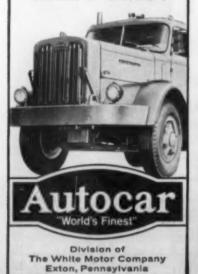




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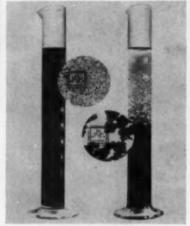
# Autocar's fine reputation

Nut and bolt assembly is far superior to the usual riveting and welding method in building a truck. It makes for more durable construction, lower maintenance and easier replacements in service. It is just one more quality characteristic that makes the Autocar "the world's finest".



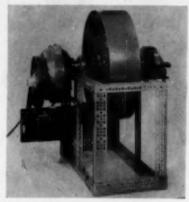
#### Equipment News (Continued)

depths of 250 ft. Drilling speed range runs from 50 to 600 rpm. In semi-consolidated materials, the Explorer is equally effective as an auger drill, declares International. Five-foot continuous flight sections can be used to auger down to 75 ft in clay or gravel with 4½-in-dia augers. The 1,466-lb drill is completely self-contained and can be mounted on any wide gage TD-6 or TD-9 crawler.



NEW FLOCCULANT-A new granular flocculating agent made by American Cyanamid Co., New York 20, is said to offer an easy and economical solution to solids pollution problems involving effluents from coal preparation plants. Preliminary trials at coal preparation plants have demonstrated that the new product improves clarity of liquids and settling rates of solids better than competitive materials, states the firm. The high molecular weight polymer, "Superfloc 16," has consistently out-performed other synthetic and natural polymers as a filtration and settling aid for solidliquid separations, it is stressed. In the photo the liquid in the graduate at the right, treated with the new flocculant, undergoes considerable settling after only 8 sec. Concentrations of Superfloc 16

required are only a few parts per million maximum, according to Cyanamid.



NEW REDUCER—A double-reduction speed reducer with an adjustable torque arm has been developed by The American Pully Co., Philadelphia, Pa. Called "Offset Shaft-King," it is available in two reduction ratios—13:1 and 20:1. Six capacities handle fractional to 40-hp drives. The design, says the firm, provides a simple means of taking up belt stretch from the primary drive. Adjustable torque arms rotate the reduction unit about its output shaft, increasing or decreasing the center distance between belt pulleys.



ROTARY SCREEN—An electromechanical screen driven by a rotary vibrator effectively handles dry or wet screenings of sand, coal, rock and other hard-tohandle bulk materials from 100 mesh to



## PYROPRENE\*

\*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7"

# Always on the move . . . . . 1,500,000 tons per year

Huge sharp-edged pieces ride over 12 mile on the Acme-Hamilton Pyroprene Belt which is running on a Barber-Greene conveyor. Over a million and a half tans of coal a year travel on this belt. Trouble is non-existent. Proof-positive that Acme-Hamilton belts haul top capacity loads for longer periods with no loss of time, or maintenance.

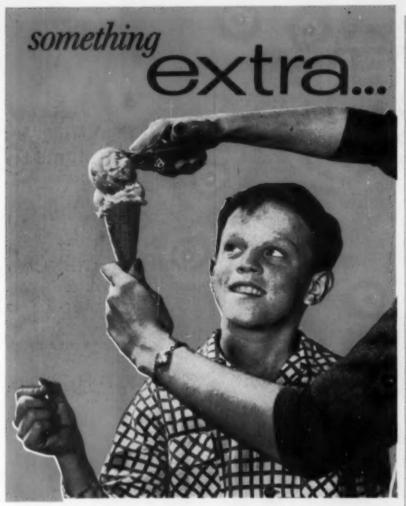
Fire Resistant Pyroprene Compound, used in Acme-Hamilton U.S.B.M. accepted belts, will not feed or spread fire. The cover is Pyroprene; fabric plies and breaker fabric are secled with Pyroprene before the belt is built. Cover has exceptional resistance to cutting, abrasion and gouging. Write Acme-Hamilton, Dept. CA-92.

## Acme ( Hamilton

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Disserved Asses P. Asher Mile Co. A Hamilton Politics Mile Co.

ATLANTA - CHICAGO - DETROIT - HOUSTON - INDIANAPOLIS - LOS ANGELES



that's what you want in a fuel...

what you get in B&O Bituminous!

Sure, bituminous coal is powerpacked—it's prepared to suit any industrial utilization—its source is most convenient to industry. But, bituminous gives you the extra that no other fuel can—nearly inexhaustible reserves, always available!



B&0

BITUMINOUS COALS FOR EVERY PURPOSE

Ask our man! SALTIMORE & ONIO RAILROAD SALTIMORE 1, MD., Phono: LExington 7-0400

#### Equipment News (Continued)

3-in lumps, announces Syntron Co., Homer, Pa. The RVS-146, fitted with dust-tight covers to prevent loss of materials and reduce dispersion, features a 4x6 ft screening surface and is available with single or double deck screening areas. It can be equipped with a 900 or 1,800 rpm drive and can be floor-or suspension-mounted. The unit's drive, a powerful rotary vibrator, eliminates the need for belts, chains and separate motor mountings, according to the firm. It is totally enclosed, pressure-tight and water-proof with sealed-in air-oil mist lubricant.



SMALL TURBOCHARGER-A turbocharger no larger than a salad plate and weighing only 24 lb has been developed for use on the International TD-O crawler tractor by International Harvester Co., Chicago 1, with The Garret Corp., Los Angeles. Fitted to the recently-announced International D-282 size-cylinder diesel engine, the 74-in turbocharger boosts power output 23% over that of a naturally-aspirated engine, according to the firm. It is noted that the advantages of turbocharging-more power and fuel savings-are available for the first time in a small crawler tractor with the manufacture of this new turbocharger.



SHORT-ARC WELDING-A new welding process developed by Linde Co., Div. of Union Carbide Corp., New York 17, permits manual and mechanized



## COMPTON "TWIN HEAD" AUGER MAKES THIN SEAM MINING PAY

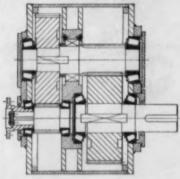
... Timken® bearing capacity makes it even more profitable

HIS coal auger makes high hourly tonnage production from thin seams possible-and makes it pay. With a drilling depth of 150 ft., it drills within 4\%" of the bottom for maximum recovery. And to take the heavy thrust and shock loads, assure economical operation, Compton uses 6 Timken® tapered roller bearings in the main drive transmission, 6 in the power divider transmission, 4 in the auger spiders. Here are 2 big reasons why: 1) They're extra tough because Timken bearing steel is nickelrich. To be sure it's the finest, we make it ourselves. We're America's

2) Extra capacity makes Timken bearings give longer life. To make sure they do, we have the most modern physical laboratory in the bearing industry for testing bearings, transmissions and other drive units. It runs them underconditions tougher than those found in actual service. To get better machines, be sure they're Timken bearing-equipped. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy

Steels and Removable Rock Bits.

only bearing maker that does.



How COMPTON, INC., uses Timken bearings in the main drive transmission of its "Twin Head" coal auger to take heavy loads, cut maintenance.

#### WHEN YOU BUY TIMKEN" BEARINGS YOU GET ...

- 1. Quality you can take for granted
- 2. Service you can't get anywhere else
- 3. The best-known name in bearings
- 4. Pace setter in lower bearing costs

BETTER-NESS rolls on

TIMKEN

tapered roller bearings



First in bearings for 60 years



This symbol on a product mean its bearings are the best.

## Quit Your Skidding! Install the Complete,Positive Skid-Proof NOLAN Mine Car Control System

NOLAN . . with 50 years of experience in the development of efficient mining equipment . . offers you see profit eppertuarities with the latest in money-saving automatics mails.

Equipment includes the Nelan Automatic Car-Leading Station for quicker, more eniform leading; the Nolan Porta-Feader for the rapid and continuous movement of cars; and the Nelan Hold-A-Trip, which eliminates the need for dangerous, timewasting manual manipulation of skids an any grades.

We shall be glad to show you Nolan equipment in a mine near you, for actual evidence of the labor-saving methods possible.





Write for FREE CATALOG!

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#### Equipment News (Continued)

welding of thin material with excellent control of the weld puddle. Outstanding feature is said to be the ability to make manual fusion welds in the range of thickness of .030 to .100 in of all common metals such as carbon steel, stainless steel, aluminum, copper, etc., in all positions and types of joints.



NEW BUSHINGS-Whitney Chain Co., subsidiary of Foote Bros. Gear & Machinery Corp., Hartford 2, Conn., has introduced oil-impregnated sintered-steel bushings which provide lifetime lubrication for Whitney MSL chain, according to the firm. Pressure and heat cause the built-in lubricant to expand and flow from the bushings, giving a constant supply of lubricant to every working part of the chain. When the drive stops, bushings re-absorb oil, assuring a permanent oil supply for the life of the chain. Whitney notes that more damage is caused by faulty chain lubrication than by years of normal service and states because of its patented bushing development its MSL chain outlasts conventional chain as much as 5 to 1 in severe operations.

REDUCE CLOGGING - A new-type gate valve said to greatly minimize the problem of slurry clogging the interior of a valve body has been developed by the Everlasting Valve Co., Jersey City, N. Y. Important features of the new valve include the unique shape of the interior of the valve and the sloping sides of the valve disc which causes the slurry material to be recirculated in the body chamber when the valve is being opened or closed. This action prevents material from packing up and causing the valve to be inoperative, according to the company. There are no internal stops within the valve body to interfere with the free flow of materials. All stops to control the travel of the operating handle are on the exterior of the valve.

#### Free Bulletins

Pumps — "Pic-A-Pump" catalog from Allis-Chalmers Mfg. Co., Milwaukee 1, has 576 pages of engineering data arranged for convenient selection of pumping units and materials of construction to meet specific applications. Hundreds of pump types, models, and sizes with numerous capacities covering almost any head conditions are carried, along with list prices. Allis-Chalmers suggests that requests be limited to those made on company letterheads.

Vibrators—Publication of a new catalog on "pulsating-magnet" electric vibrators for keeping stubborn bulk materials and bulk parts free flowing from bins, hoppers and chutes, is announced by Songtron Co., Homer City, Pa. Illustrated pages give complete descriptions, data and specifications for 14 standard vibrators ranging from the 2-lb V-2 model to the 950-lb V-600, capable of vibrating bins with capacities weighing over 150 tons.

Electrical Data—A new booklet, "Convenient Tables & Formulas," has been published by Westinghouse Electric Corp., Pittsburgh 30. It includes tables, formulas and graphical symbols summarizing electrical data, properties of materials, heat transfer and steam information, measurements and other subjects.

Wire Rope—Losses due to fatigue of wire rope can be curbed by following the suggestions in Red-Strand Service Bulletin No. 105, according to Leschen Wire Rope Div., H. K. Porter Co., Inc., St. Louis 12. The 4-p folder explains the importance of the proportion between the diameter of wire rope and the diameter of sheaves and drums on which it runs.

Mining Tools — A revised catalog, "Carmet Carbide Mining Tools," including new information on the JR-3 style cutter bit, is being distributed by Allegheny Ludlum Steel Corp., Detroit 20. The catalog has photographs and drawings of all mining tools, including bits, coal drill bits, and roof drill bits.

Gas Flow—A 12-p booklet from Air Reduction Co., Inc., New York 17, handles the firm's line of gas flow control equipment for argon, helium and carbon dioxide. The operation and various applications for this equipment are described and photographs are shown.

Trucks—A 24-p brochure describing the Haulpak off-highway truck line has been released at Letourneau-Westinghouse Co., Peoria, III. Full of photos and diagrams, it points out design and operational features of the new line.



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COMPLETE SPECIFICATIONS WILL BE GLADLY FURNISHED UPON REQUEST



#### ACME MACHINERY COMPANY

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WAREHOUSE AND SALES OFFICE (IN PRINCIPAL MORGANTOWN, W. VA. MINING AREAS

## **Among The Manufacturers**

Roberts & Schaefer Co., engineers and contractors to the coal industry, has moved its Chicago offices from 130 N. Wells St., to 201 N. Wells St.

Allis-Chalmers Mfg. Co. acquired the Tractomotive Corp. of Deerfield, Ill.

The new facility employs about 725 workers in the manufacture of earth moving equipment and has 135,000 sq ft of manufacturing area.

The Mining Div. of The Jeffrey Mfg. Co. has announced several field appointments in its sales organization.

Jack Wilson has been named assistant district manager, Mining Div., Pittsburgh. Carl G. Schilbe has been appointed apparatus sales engineer, Morgantown, W. Va. Succeeding Mr. Schilbe as district manager of the Salt Lake City, Utah, district office, is A. E. Shannon, with the Mining Div. for 29 yr. Other appointments include: Pat Campbell as apparatus sales engineer, Bluefield district; Donald Ellis as apparatus sales engineer, Logan territory; and Dale Hirschfield, parts sales engineer, Logan area.

Joy Mfg. Co. has announced new assignments in its Coal Machinery Div.

R. A. Lehner has been named vice president and assistant general manager of the division and J. P. Courtwright has been chosen vice president, sales. Walter V. Spotte has been promoted to assistant sales manager, St. Louis territory, and Walter G. Hutz has been assigned to the Pittsburgh district office in the Uniontown, Pa., area, formerly handled by Mr. Spotte.

#### **Briefs**

Appointment of John L. Weidy as marketing manager, Pittsburgh Works, and of George W. Hanafee as manager of the Indianapolis district has been announced by Allis-Chalmers Mfg. Co.

John W. Logan became vice president of Simplex Wire & Cable Co.

William E. Carter has been named branch sales manager in the Pittsburgh, Pa., area for Exide Industrial Div. of The Electric Storage Battery Co.

Ohio Brass Co. announced the appointment of Otto Price Jr. as district manager for the area including Connecticut, Massachusetts, Rhode Island and Vermont.

J. H. Coover was appointed to the newly-created office of executive vice president, D-A Lubricant Co., Inc.

W. O. Murray is the new product manager of hose and hose fittings for Parker-Hannifin Corp.

F. B. Shew has been named manager of sales, commercial cranes and excavators, Bucyrus-Erie Co.

J. F. Angle moved up to district

manager of the new Salt Lake City district office for The Okonite Co.

M. R. Wilkens was chosen to handle the new position of sales planning manager for the industrial products divisions, Hewitt-Robins, Inc.

A. Terry Jr. retired as vice president, international administration, and as a director of Dorr-Oliver, Inc.



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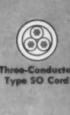


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2-512DA Goodman Cutting Machines, 250
Valts D.C.

2-7AU Sullivan Cutting Machines, 250 Volts

D.C.
1-124AA Goodman Slabber with One Let of New Parts.
3-212 AB Goodman Machines.
2-412 AA Goodman Machines.
2-35L Jeffrey Machines 35 & 50 H.P.

CONTINUOUS MINERS FOR SALE 3-4JCM Joy Continuous Miners, 440 Volts A.C.

#### RECTIFIERS FOR SALE

1-300 KW Westinghouse Scaled Ignitron Mer-cury Arc Rectifier, 7200/12470 Volts, 3 phase, 60 cycle primary and 275 Volts D.C. secondary. Complete with switching equip-ment and associated controls. Latest type,

milite new.

1-300 KW Westinghouse, Car Portable Recti-fier, 7200/13000 Volts, 3 phase, 60 cycle primary and 275 Volts D.C. secondary.

#### ROTARY CONVERTER FOR SALE

1-150 KW Retary Converter, Serial No. 1054562, with 150 KVA transformer and panel boards.

COAL DRILLS FOR SALE 25-CP-472 Electric Coal Drills, 250 Velts D.C. 5-CP-572 Coal Drills.

#### CRUSHERS FOR SALE

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-Scottdele 18" x 30" Deuble Roll Crushers.
Like New.
1-36" x 36" Double Roll McLanchan Stone
Crusher, complete with 100 H.P. Motor.
1-24" x 42" McNally Fittsburg Single Roll
Crusher.

ROOF BOLTING MACHINES FOR SALE 2-Fletcher Roof Bolting Machines, Rubber Tired, Self-propelled.

#### COMPRESSORS FOR SALE

3-Acmo Self-propelled Air Compressors, 83R, Model 168, Capacity 176CFM, with 40 H.P. Reliance Compound Motor, Excellent Condi-

#### LOCOMOTIVES FOR SALE

2-10 Fon Goodman Locomotives, Anti-Friction, Centractors. Medern.

1-15 Fon Goodman Locomotives, Anti-Friction, Centractors. Medern.

1-10 Ton Goodman Locomotive, Serial No. 4371-17ps 32A04-T, 259 Volt D.C., 42" track gauge, Height 34".

#### ROCK DUSTERS FOR SALE

1-MSA Track Mounted Rock Duster, 10 H.P., A.C. or D.C., high pressure, 30" high, any

2-MSA Bantam Rock Dusters, Rubber Tired,

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2-MSA Bantom Rock Dusters, Skid Mounted.

1-American Mine Door, Wheel mounted bantom type rock duster, 250 Velts D.C., 22" high.

#### HOISTS FOR SALE

10—#11½ Vulcan-Denver Material Hoists, Cemplete with 3 M.P. D.C. Compound Wound 1750 RPM General Electric Mater.
2-Brownia Hoists, Model HKK-Good condition.
1-Brownia Hoist, Model HKM-Good condition.

#### ELEVATORS FOR SALE

1-P111-14 Jay Elevators For SALE
2-Jay P111-16 Elevating Conveyors.
2-Barber-Greene Self-Propelled Elevators, 30'
long, gasolina or electric.
1-Barber-Greene Self-Propelled Cat Mounted, self-loading-gasoline driven.

#### CAT TRUCKS FOR SALE

1-Goodman Low Vein Caterpillar Truck. 4-T2-SAPE Joy Trucks, 250 Velts D.C. Per-

#### CHAIN CONVEYORS FOR SALE

5-61AM Jeffrey Chain Conveyors, 10 H.P. 300'

leng. 3-61HG Jeffrey Chain Conveyors, 5 H.P. 40'

#### DIESEL PLANTS FOR SALE

DIESEL PLANTS FOR SALE

1-60 KW, G.M. Diesel Generator Set, with
60 KW, 250 Volt D.C. Delco Generator.

1-100 KW Wauksaha Diesel Generator with
220/440 Volts D.C.

1-100 KW Diesel Generator Unit, with G.M.
Diesel Engine and 100 KW Generator Unitwith Caterpillar Diesel Generator Unitwith Caterpillar Diesel Generator Unitwith Caterpillar Diesel Generator Unitgenerator self-regulating, 220 Volt A.C.

1-250 KW Diesel Generating Plant, consisting of Westinghouse 250 KW 275 Volt
Compound Wound Generator driven by
Twin 6110 General Metars Engines, Cemplets with switchgear and all appurtenances. New in 1956.

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I SO KW Westinghouse MG Set, 440 Velt AC, 250 Velt DC.

1-300KW Westinghouse Motor Generator Set, synchronous motor, 433 KW Output, 435 KVA, 2200 Velts, 1200 RPM. D.C. generator 300 KW, 275 Velts, 1200 RPM. Cempound Wound. Complete with D.C. panel and switch gear.

Wound, Complete with D.C. panel and switch gear.
3-50 KW G.E. and Westinghouse Motor Generator Sets, 2300 Volts A.C., 275 Volts D.C. Complete with switching generator Set, Complete with manual brakers, A.C. and D.C. Switchgeor 2300/4000 Volts A.C. and 275 Volts D.C.
1-200 KW Ridgeway Motor Generator Set, Complete with microgram of 1600 amp. 1-T-E automatic circuit breaker, 2300 A.C., 275 Volts D.C.

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1-1200 ft. Goodman 97C Belt Conveyor 30" 1-Goodman 99-5-07-36 Tandem, 36" wide Belt, head and teil complete with 40 H.P. drive. 2 only 1200' 26" Belt Conveyors with 30 H.P. 250 Volt D.C. Drives.

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10-Goodman S12 Cutter Bars and Chains.

240-AC&F 42" Gauge, 48" high Drop Bottom Mine Cars. Condition like new.

1-24" Fan with drive.

2-71/2 H.P. Tricycle Type Rubber Tired Mine Tractors, 71/2 H.P. 220 Volt Single Phase Motors or 250 Volt D.C. Motors.

130-Sanford-Day S ten Capacity Bottom Dump Mine Cars, 42" gauge, 40" high.

3-24 J Motors, 71/2 H.P., 250 Volt D.C.

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2—14BU-3FE Joy Londers, 250 V., D.C., 28" DH
2—12BU-9E Joy Londers
3—12BU-9E Joy Londers
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1—5BU Joy Shuttle Cars
1—1—10 Shuttle Cars
1—10 Joy Shuttle Cars
1—10 Joy Shuttle Cars
1—10 Joy Cat Trucks
1—7L-11-7PE and PPE Joy Elevators
1—10 Joy Cat Truck
1—10 Joy Cat Truck
1—10 Joy Shuttle Cars
1—10 Joy Cat Truck

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1—50KW A Gaseline Generator Unit
1—50KW A Gaseline Generator Luit
2—50KW A Gaseline Conventor Unit
2—Armatures for 150 and 200KW Retary
2—600 A 600 Auto Transformers
138—Transformers from 5KVA to 500KVA

#### CUTTING MACHINES

CUTTING MACHINES

1—824 Gaudman Stabber
5—7AU Sullivans
17—11B Sullivans, 35 & 50 h.p.
15—12AB & 12AA Standard Goodmans
2—112AA Universal Goodmans
2—112AA Universal Goodmans
5—212A Baby Goodman Cetting Machines, with busdusters
5—312 Goodman Cetting Machines, 230 V., B.C.
1—201 Jeffrey 207, 444 Volt A.C.
3—35L Jeffrey Cutting Machines
5—318 A 55B B Jeffreys, A.C. and D.C. Bugdusters and Trucks available

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LOCOMOTIVES

2—20 Ton MH77 Joffreys, 42" t.g.,
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44" O.H., 49" t.g., Excellent
9—13 Ton Locomotives, Excellent
9—13 Ton Locomotives, 250 V., any gauge
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1—6 Ton MH82 Jeffrey, Locomotive
1—6 Ton MH82 Jeffrey, Locomotive
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RAIL AND WIRE

816—Tens 30. 40, 56, 65 & 70 lb. Relaying Rail
4,200'—1,800,000 CM Feeder Cable, Issuated
4,200'—1,800,000 CM Feeder Cable, Issuated
3,197'—750,000 CM Insulated Copper Feeder Wire
3,197'—750,000 CM Insulated Copper Feeder Wire
681'—300,000 CM Insulated Copper Feeder Wire
681'—300,000 CM Insulated Copper Feeder Wire
681'—300,000 CM Insulated Copper Feeder Wire
7,000'—470 Stranded Insulated Copper
7,003'—670 Stranded Highline Wire
7,038'—670 Stranded Highline Wire
70,344'—470 Stranded Highline Wire
70,370'—170 Salid Copper Trans. Line
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- Joy 14-8U Loader, high pedestel, 7CE.

  128U10E Joy Loaders complete with Piggy-Backs.

  Joy 12-8U Loaders, 220 volt AC.

  Joy 12-8U Loader, 220 volt AC.

  Joy 20-8U Loader, latest type.

  Joy 8-8U Loader, latest type.

  Joy 8-8U Loader, 220 volt AC.

  Joy curved Bar Head, camplete,

  Reliance 24-J Moters, 7½ H.P.

  9-J Metors, 4 H. P.

  Goodmen 660 Loader on cots, excellent.

  Goodmen 665 Loader on cots, latest type.

  Joy 8-8U Loader, 26" his.

  Joy 65C Shottle Cars, rebuilt.

  Joy 65C Shottle Cars, latest type.

  Joy 55C Shottle Cars, rebuilt.

  Joy 65C Shottle Cars, rebuilt.

  Joy 32E10 Shottle Cars, rebuilt.

  Joy 32E10 Shottle Cars, rebuilt.

  Joy 32E15 Shottle Cars, rebuilt.

  Joy 32E16 Shottle Cars, rebuilt.

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- velt DC.

  velt DC.

  Goodman 212 Cutting Machines, 19" high.
  Goodman 312 Cutting Machines, 17" high.
  Goodman 312 Cutting Machines, 19" high.
  Goodman 412 Cutting Machines, 19" high.
  Goodman Machines, 20/440 volt AC.
  Goodman Machines on Cats, 31" high. All hydraulic.
  Goodman 512 Machines with Bugdusters.
  Goodman 512 Cutting Machines, 220/440 volt AC.

  Goodman 112 Cutting Machines, 220/440 volt AC.

  Las Narse lew vein Machine Carrier on rubber.

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- 1-servey 70 URB, rubber-tired Cutter, Universal head, perfect condition.

  1-Joy 11RU Rubber Tired Cutter with hug-duster, Universal head, like new.

  6-7AU's an track, Universal head.

  2-leffrey 29UC Cutting Machines. Universal head, cuts anywhere in seam, 38" high, an cats, 250 volt D.C.

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- 1-Geedman 6 ten 91-A, 27" high, armer plate frame.
- frame. 2. Jeffrey 13 ton, type MH-110, 36", 42" and 44" Ga.
  2-Jeffrey 10 ton, type MH-110, 42" and 44" Ga.

- 48" Ga.

  1-G.E., 4 ton, type 825 Lecomotive, 22" high.
  10-G.E., 6 ton, types 801, 803, 821 Lecomotives, 42", 44" and 48" Ga.

  1-G.E., 8 ton, type 822 Lecomotive, 44" Ga.

  3-G.E., 10 ton, type 809 Lecomotives, 42", 44" and 48" Ga.

  2-Goodman, type 33, 6 ton, 44" and 48" Ga.

  3-Westinghouse, type 902, 4 ton, 42" and 48" Ga.

  6-G.

- 2-Westinghouse, type 904, 6 ton, 44" and 48"
- 2-Westinghouse, type 986, 44" and 48" Ga. 2-Westinghouse, type 987, 18 ton, 44" and 48" Ga.

- 8-Jeffrey MH-78 Lecometive Units, cheep. 4-Jeffrey MH-88 Locometive Units, real bar-
- gains. 6—Jeffrey MH-100 Locomative Units, reason-
- 6—Jeffrey min-the second of the colors of th

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- wand.
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  2-Jefrey 9UC Universal Machines on Cuts.

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  1-Goodman en cuts. 31" overall height.

  3-Baby Goodman 212's, rebuilt, 250 veit DC.

  2-Goodman 212 Cutting Machines, 19" high.

  3-Goodman 312 Cutting Machines, 19" high.

  3-Goodman 312's, rebuilt, or as removed from service.

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  3-Goodman 112's, 220/440 volt AC.

  1-Joy 7-8 Cutting Machines, 7250 veit DC.

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  10-Goodman 12AA's and 112AA's, 250 v. DC.

  2-Goodman 724 Slabbers.

  6-Jeffrey 351's, alike new, 17" high.

  2-Jeffrey 351's, an low vein trucks.

  15-Jeffrey 351's, an low vein trucks.

  15-Jeffrey 351's, an low vein trucks.

  2-Jeffrey 290's on track.

  2-Jeffrey 290's on track.

  2-Jeffrey 291's on track, perfect.

  2-Jeffrey 291's on track, perfect.

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- LOADING MACHINES
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  16—Joy Leaders, 88U, 118U, 128U, 148U, 208U.
  2—Goodman 865 Leaders, 26", en cats.
  1—Goodman 660 Leader, en cats.
  1—Goodman 660 Leader, en cats.
  2—Joffray 61 CLR's, en rubber, 26".
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  2—Jeffray 61 CLR's, en rubber, 26".
  2—Myers Whatey Ne. 3 Automatic Loaders.
  2—Clarkson Loaders, 26" above rail.

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- 2-Joy 38" Underground Belt Conveyors, 500' to 2000' such. Excellent.
  2-Goodman 97-C, 36" Conveyors, 1500' long.
  3-Robbins 30" Belt Conveyors, 200' to 2000'.
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  2-200KW Westinghouse Retary Converters, 275 DC, newly rewound.
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- 1-300KW Westinghouse, 600 volt, 6 phase, Rotary Cenverters.
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  2-300KW HCC-6 Retary Cenverters, 6 phase, 600 volt DC.
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  1-Cummins 125 KW, Diesel with 250 volt DC Generator.

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- 2-Phillips Carriers, 44" and 48" Ge.

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  300 Mine Cars, drap bettem, 42" Ga.

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  300 Mine Cars, 18" high, end dump, 44" Ga.

  300 Mine Cars, 18" high, end dump, 44" Ga.

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  1-10 ton Life Car Scale with Recorder.

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  1-Jeffrey 6" Aerodyne Fan,

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  1-Jeffrey 8" Aerodyne Fan,

  1-Jeffrey 8" Aerodyne Fan,

  1000 Five Gallon G. 1. Cans, crew lids.

  1000 Five Gallon G. 1. Cans, crew lids.

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  100 Tansformers Fan 1 to 300 KVA, 110 to

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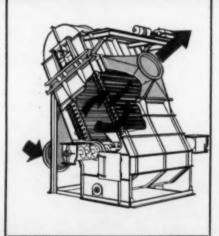
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